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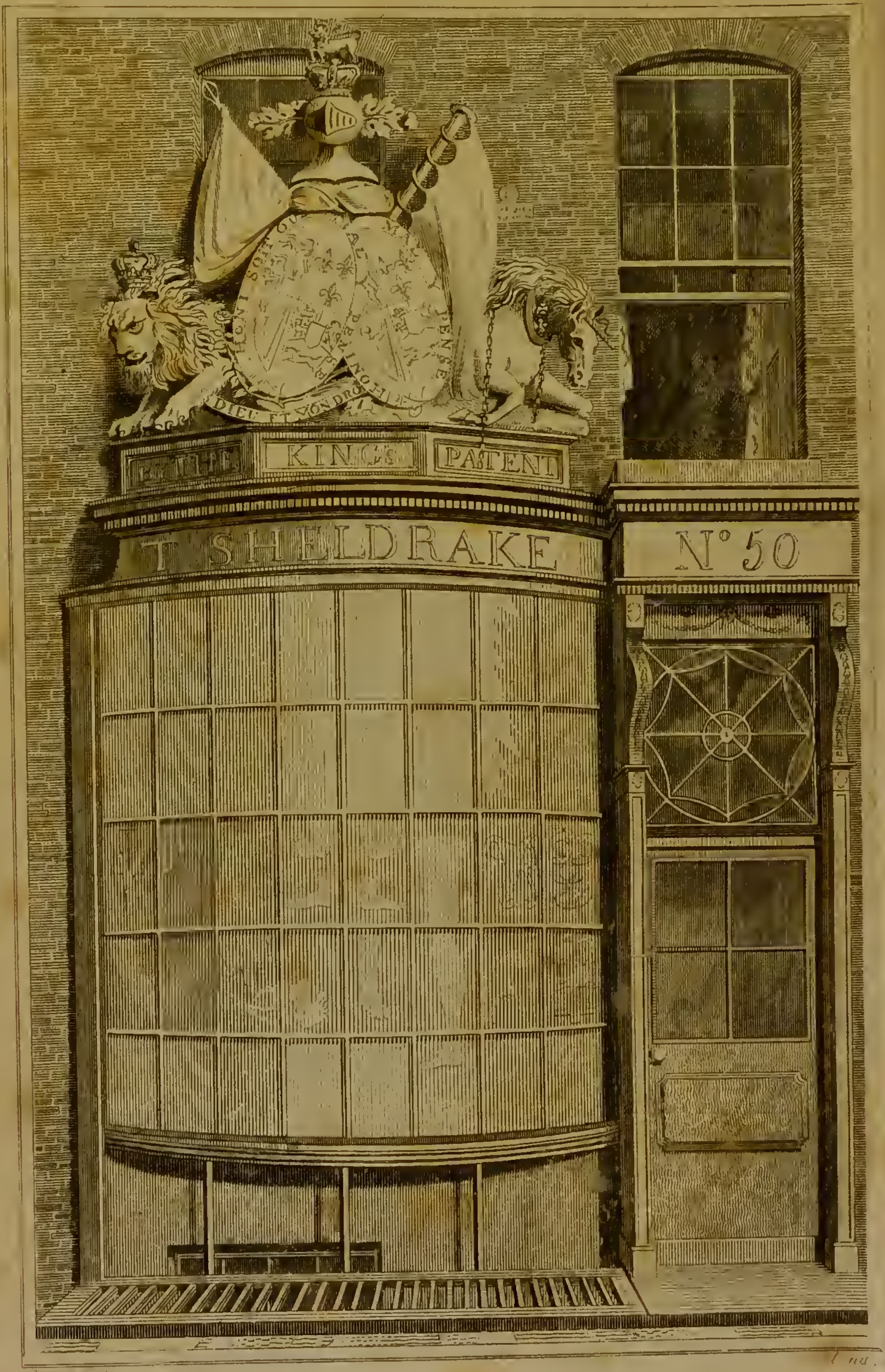
# A
# PRACTICAL ESSAY
# ON THE
# CLUB-FOOT, &c.



*Truſs Maker to the Westminster Hospital, & Mary-le-bone Infirmary*

**N° 50, STRAND, LONDON.**

# A PRACTICAL ESSAY ON THE CLUB-FOOT,

And other DISTORTIONS in the LEGS and FEET of CHILDREN, intended to ſhew under what Circumſtances they are curable, or otherwiſe;

WITH

## THIRTY-ONE CASES

That have been ſucceſsfully treated by the Method for which the AUTHOR has obtained the KING'S PATENT,

AND

The SPECIFICATION of the PATENT for that Purpoſe, as well as for curing Diſtortions of the Spine, and every other Deformity that can be remedied by mechanical Applications.

BY

## T. SHELDRAKE,

TRUSS-MAKER TO THE WESTMINSTER HOSPITAL,
AND MARY-LE-BONE INFIRMARY.

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1798.

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TO

WILLIAM LYNN, Esq.

SURGEON

TO THE

WESTMINSTER HOSPITAL;

AS A

TESTIMONY

OF THE

FRIENDSHIP

WITH WHICH HE HAS BEEN MANY YEARS FAVORED,

THIS ESSAY

IS DEDICATED BY

THE AUTHOR.

*March* 25*th*, 1798.

# PREFACE.

It may be expected that, in laying this work before the Public, I ſhould give ſome account of its contents, and the motives that have induced me to publiſh it.

As the treatment of the diſeaſes it relates to, has never formed part of the regular practice of ſurgery, it has been, if practiſed at all, followed indiſcriminately, by ignorant mechanics and empirics of every deſcription; and, on no ſubject, has the world been ſo groſsly and repeatedly duped by the abſurd pretences of that claſs of people; ſo much ſo, that whoever

ever ſhall attempt to publiſh a rational and ſucceſsful method of treating theſe diſeaſes, will render eſſential ſervice to a very numerous claſs of patients, if he ſucceeds; but he cannot expect to do ſo, unleſs he can eſtabliſh his facts beyond the poſſibility of contradiction, and explain them ſo as to avoid the imputation of empiriciſm.

The ſituation in which I was bred, having given me numerous opportunities of ſeeing theſe diſeaſes, in all their varieties, and of ſeeing they were always treated in a way from which little benefit was derived, naturally directed my mind to the ſubject; and the nature of my profeſſional education and purſuits, during the laſt twenty years, having enabled me to conſider them in a way that had eſcaped the obſervation of others, and to make numerous experiments, in hopes of being able to cure them; I at laſt ſucceeded in ſome caſes, in an eminent degree. An account of theſe caſes was publiſhed ſeveral years ago; and the attention that publication excited, procured me numerous opportunities for purſuing my enquiries on this ſubject, the reſult of which will be found in the enſuing pages.

In my obſervations on diſtortions of the legs of children, I endeavoured to explain what had been attempted by others, in order to aſcertain, with more accuracy, what might be hereafter done by myſelf. The preſent work is a continuation of, and perfectly diſtinct from, and not merely a new modification of the former.

It contains the hiſtory of ſome caſes which were placed, with unlimited confidence, under my care, and in which I was, *therefore*, perfectly ſucceſsful. And, as I knew I muſt encounter the ſcoffs of incredulity, the doubts of ſcepticiſm, and the inſinuations of thoſe who might be envious of my ſucceſs, I had the precaution to requeſt, that they might be ſhewn to Gentlemen in the profeſſion of Surgery, whoſe knowledge, judgment, and integrity, were unqueſtionable, and who would, therefore, always aſcertain whether what I attempted was rational, and what degree of ſucceſs attended my efforts. The unbiaſſed opinions of theſe gentlemen are added to the hiſtory of each caſe, and will form a maſs of incontrovertible evidence to the truth of the facts.

In the courſe of practiſe of ſome extent, I have been conſulted by perſons at a diſtance from London, who from various circumſtances, limited their ſtay in town, to time that was inſufficient to effect a perfect cure; by others who could not come to London at all, I have been ſent for to their reſidence, where my ſtay was neceſſarily limited. In ſuch caſes, after having performed the moſt eſſential operations, it was neceſſary that I ſhould leave the patient to the care of thoſe, who I may, without arrogance, ſay, had not experience equal to my own. In ſome of theſe caſes, the ultimate ſucceſs has been complete; in others, it has not. I have related theſe caſes with candour; and, as I prove that in all thoſe which were under my abſolute controul, the ſucceſs was complete, I may expect it will be believed, that in ſuch of theſe as were not completely cured, the failure is to be attributed to thoſe circumſtances that prevented me from attending them.

As it is now certain that, under ſome circumſtances, theſe diſeaſes may be perfectly cured, it is equally certain that, under others, they are incurable. It is always deſirable to aſcertain, *a priori*, what probability there is, that we ſhall ſucceed in any caſe we may undertake. As I have reaſon to believe, that many of theſe caſes are curable, at later periods in life than has been commonly ſuppoſed by thoſe who would believe that any of them might be cured at all, I have endeavoured to ſhew, by an enquiry into the progreſs of oſſification in the diſtorted parts, and the difference between the form and action of the muſcles, in the natural and in the diſeaſed ſtate, under what circumſtances theſe diſeaſes are curable, or otherwiſe. Thoſe, whoſe knowledge or information enable them to underſtand this part of the animal economy, will determine, how far I have ſucceeded in my undertaking, in this reſpect.

The method of cure muſt be continually varied, according to the different circumſtances of each caſe; for this reaſon, it could only be practicable to explain the general principles, which, I hope, has been done in the moſt ſatisfactory manner. In order to obtain a patent, it is neceſſary to ſpecify, in the cleareſt manner, every particular of the invention. It is, perhaps, not eaſy to explain a ſubject like this, ſo as to make it conſiſtent with legal definitions; but as it was neceſſary this ſhould be done, I not only conſulted gentlemen eminent in the law, but ſome medical friends, in whoſe opinions I have much confidence, and who had ſeen ſome patients under my care: in conſequence, I had the ſatisfaction to be told by the former, that every thing had been done that the law could require, and by the latter, that every part of the invention was explained, ſo as to be perfectly intelligible to a profeſſional man. This being the caſe, I thought it moſt adviſable to print the Specification complete, as the beſt illuſtration of the method of cure, which it is the object of this eſſay to recommend in theſe, and every caſe of diſtortion, to which it can, with propriety, be applied.

Such are the contents of the work I now ſubmit to the Public, with a full reliance that, whatever degree of notice it may be found to merit, it will finally obtain from that tribunal, to which every attempt to be uſeful to mankind, will always be applauded or cenſured, as it deſerves.

T. SHELDRAKE,
No. 50, Strand.

# POSTSCRIPT.

Having employed near twenty years on the ſubject of this Eſſay, and brought it to the ſtate in which I now lay it before the Public, I may be excuſed for feeling a degree of honorable anxiety, that no miſtake or miſconduct of any one who, being totally ignorant of the ſubject, ſhall *venture* to practiſe the method of cure now recommended to notice, may be attributed to myſelf. It is neceſſary to mention this, becauſe there exiſts a perſon, ſo inſignificant, as to be, perſonally, beneath all notice, and ſo atrocious as to impoſe, when an opportunity offers, himſelf upon the incautious, as the author of my works, and even deny my exiſtence, when by ſo doing he can hope to ſubſtitute himſelf in my ſtead; as the following, and many other inſtances I could produce, will ſhew.

A Gentleman, to whom I am well known, recommended a patient with diſtorted feet to be put under my care. The father told him he had done ſo. At the end of twelve months, the child was no better, and, upon examination, the ſurgeon found the means that had been uſed ſo different from thoſe he had ſeen me apply in ſimilar caſes, that he required a meeting, at which, to his great ſurprize, he found not myſelf, but a perſon of the ſame name, that he had never before heard of. This *honeſt fellow* was immediately diſcharged, and the child is now under my care.

A Gentleman in Dublin had ſent his ſon to London, to be placed under my care; he afterwards requeſted a friend, who was coming over, to call on me and ſee the child. This Gentleman was led, by an advertiſement, to ſuppoſe I had removed to a different part of the town. Upon application there, he could hear no account of his friend's child, and was told, there muſt be ſome unaccountable miſtake, as there was no other perſon of the name in London. Upon referring to his pocket-book, he found my addreſs, and the miſtake was rectified.

The firſt was a fraud on the patient, for ſake of the profit that might be derived from the caſe; the ſecond was mere villainy, without even that motive to excuſe it. The perpetrator has taken uncommon pains to induce me to chaſtiſe him publicly, in hopes of deriving ſome advantage even from that diſagraceful kind of notice; but as I know his principles and motives, I ſhall not gratify them any farther.

Having mentioned theſe circumſtances, I ſhall only requeſt, that thoſe who may wiſh to apply to the author of this work, will particularly attend to the addreſs on the Title-page, &c. and obſerve that in whatever other part of the town they may find the ſame name, they will find a perſon who is totally ignorant of the ſubject, though, perhaps, not unwilling to take advantage, like thoſe I have already mentioned, of any miſtaken application to him.

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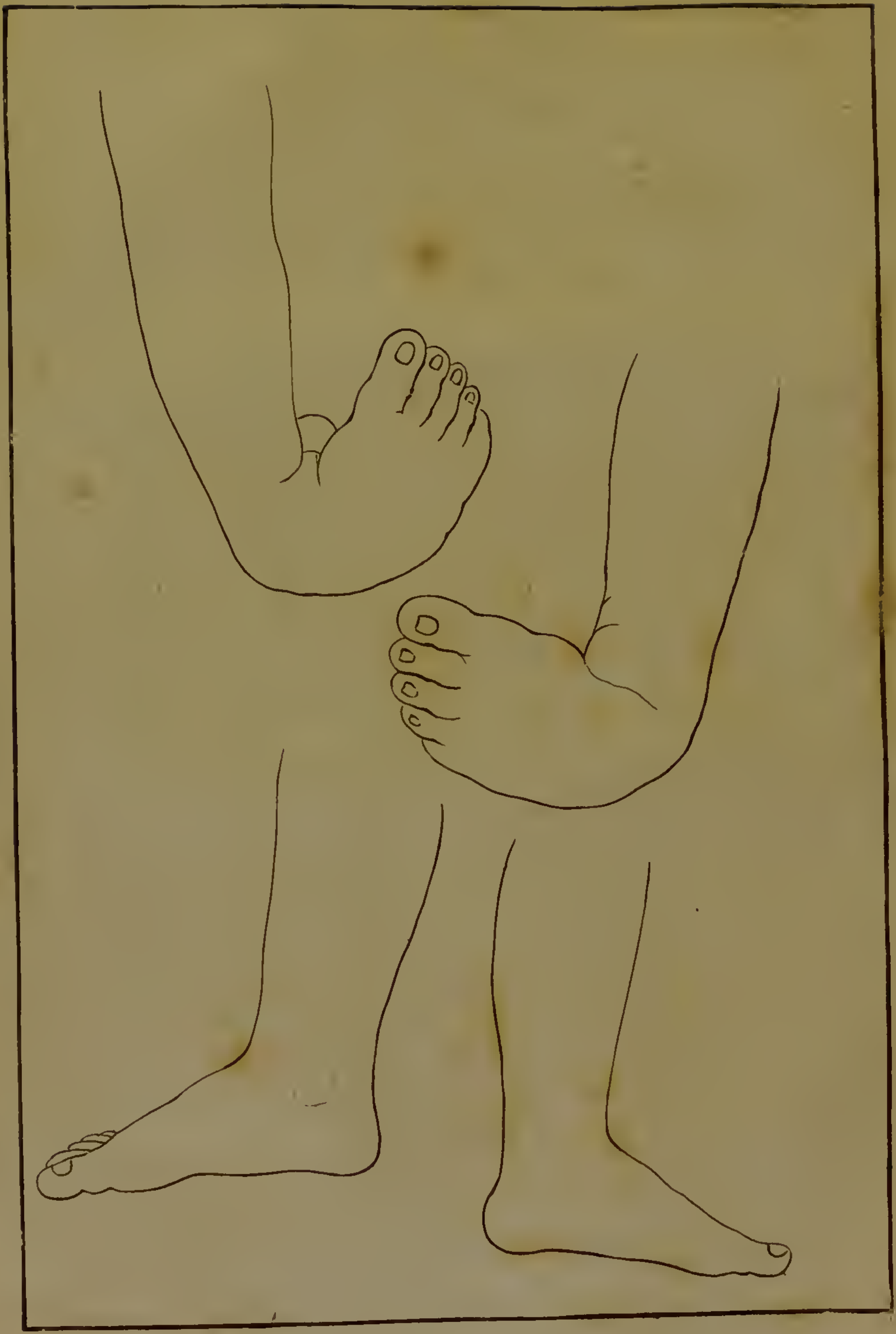


# AN
# ESSAY
# ON THE
# CLUB-FOOT, &c.

## CASE I.

May 1ſt, 1796. A Son of —— Wells, No. 40, Monmouth Street, was born with two club-feet: the next day he was taken to the Weſtminſter Diſpenſary in Gerrard Street, and, by Mr. Ford, recommended to me. The bones of the left leg were perfectly ſtrait; the heel drawn upwards; the aſtragalus drawn inwards, ſo much that the inner ancle could not be felt, and that part of it that ſhould have been the outſide of the foot was nearly at the bottom; the os cuboides was much diſtorted, with reſpect to the aſtragalus; and the metatarſal bones diſtorted in the ſame degree, with reſpect to the cuboides and cuneiform bones. The gaſtrocnemii and tibialis poſticus were permanently contracted to ſuch a degree, that the foot was perfectly rigid. The right foot only differed from the left, by being ſomething more flexible. The appearance of both is correctly repreſented in the annexed Plate, *Fig.* 1. and 2.

May 11th, I began my operations; and proceeded uniformly and regularly, according to the principles I have elſewhere deſcribed, without any untoward circumſtance, till July 8th, when I took off my bandages; the feet were then as repreſented by *Fig.* 3. and 4. There was no appearance of the original malformation, nor any appearance of tendency to return to it; I therefore conſidered the cure to be compleat, and ſent the patient to be examined by Mr. FORD, from whom I received the following note.

'Mr. FORD preſents his compliments to 'Mr. SHELDRAKE, and has had great ſatisfaction in ſeeing the child of Mr. 'WELLS, who appears to him perfectly 'cured of the diſtortion of his feet.'

'Golden Square,
'July 12th, 1796.'

As this caſe was taken up ſo ſoon after the birth, and had been treated with compleat ſucceſs, in Mr. Ford's opinion as well as my own, it appeared a proper one to determine what danger there may be of a relapſe, in ſuch caſes, after the feet are apparently cured. To aſcertain this point, I directed that he ſhould be brought to me in three months, after I had diſcharged him. It then appeared, that no permanent diſtortion had taken place; but, in conſequence of the child's efforts to uſe his legs, from weakneſs in the capſular ligaments of the foot, and want of power in ſome of its muſcles, there was a conſiderable tendency to the original diſtortion. I could, without difficulty, place the feet in their natural ſituation; but if left to themſelves, the continual exertions of the child, in learning to walk, would, in time, have produced a permanent diſtortion, ſimilar to the original deformity: I therefore took him again under my care, and at the end of two months, diſcharged him to appearance perfectly well; nor has he ſince had any relapſe. At the time I am writing

this,

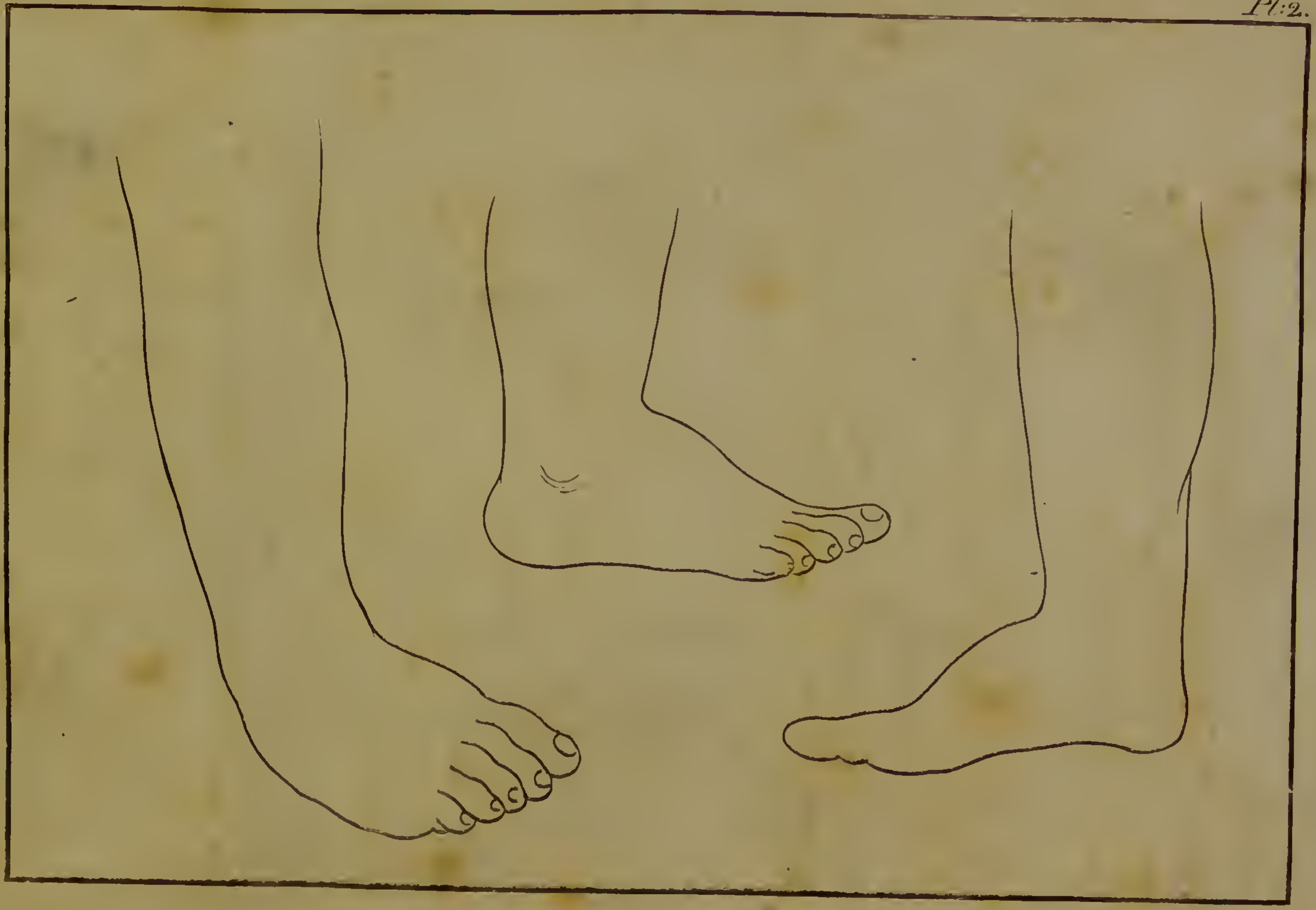
this, he is ten months old; he ſtands firmly on his feet; nor has he the leaſt remains of, or tendency towards the original deformity.

In the general obſervations annexed to theſe caſes, I ſhall endeavour to account for this tendency to relapſe: *here* it may be proper to obſerve, that this caſe ſhews how neceſſary it is to attend cloſely, to prevent a relapſe, almoſt till the patient can go alone, notwithſtanding he is apparently cured as ſoon after the birth as is in the nature of things poſſible.

## CASE II.

In the ſummer of 1795, I was conſulted by Mr. Lynch, No. 55, Upper Dorſet Street, Dublin, concerning his ſon, who was born with two club-feet, which, when examined, appeared to me capable of being cured.

Mr. L. had, previouſly, conſulted ſeveral gentlemen in Dublin on the caſe; and, as no means of curing this diſeaſe was there known, Pl:2.



known, had been told it was incurable. As my opinion was ſo different from thoſe he had already obtained, he, naturally enough, thought it neceſſary to proceed with caution, in placing the child under my care: from this motive, I ſuppoſe, he propoſed that I ſhould enter into a legal agreement to cure the child for a ſtipulated ſum, ſubject to the opinion of a ſurgeon, to be named by himſelf; and if, at a future period, the child ſhould relapſe, to return the money paid me, if I failed to cure him a ſecond time.

Such a propoſal, on any other occaſion, I ſhould have rejected; but as I ſaw the motives which induced him to make, I reſolved to accept it; though ſo much time was loſt in the negotiation, that I would not engage in the cure during my ſtay in Ireland: I therefore agreed to his terms, provided the child was put under my care in London.

In December, 1795, he was brought to London. He was then more than twelve months old ; his feet were nearly alike, and were perfectly rigid ; one of them is exactly repreſented in the annexed *Pl.* II. My operations were immediately begun. The child's health ſoon began to decline, it was ſaid, from change of climate : Mr. WILSON of Bedford Street was, on that account, deſired to attend him ; and we were ſoon convinced, that his ill ſtate of health was occaſioned by every kind of miſconduct in his nurſe. To ſuch a length was this carried, that none of Mr. W's directions were attended to ; and we ſaw him verging towards the grave, without a chance of reſcuing him, unleſs he was previouſly placed with another nurſe.

This no one was impowered to do ; and as much time was neceſſary to obtain ſuch authority from his parents, it was agreed to ſuſpend my operations till he could be removed, and his health be, in ſome degree, reſtored.

He had been ſo much reduced by ill treatment from his nurſe, that it was the end of March before he was ſufficiently recovered for me to attend him. I then recommenced my operations, and every thing went on favourably, till his feet were perfectly reduced to their natural form. When I ſaw the meaſure was proper, I deſired Mr. Lynch to have the child examined, according to his own propoſal. He, for that purpoſe, referred us to Mr. Pearson of Golden Square, with whom I had, at that time, no perſonal acquantance; and who, after examining the child, gave the following opinion.

'Golden Square, July 30th, 1796.

'I have examined the feet of Maſter
'William Lynch, this day, and have the
'ſatisfaction of atteſting, that the defor-
'mity is ſo far removed, that the child
'walks evenly and firmly; nor ſhould I
'have remarked any particular deviation
'from the natural appearance, if I had not
'previouſly known his ſituation.

'I am of opinion, that the child will
'enjoy the perfect uſe of his feet, and that

‘ no appearance of the former curvature
‘ will remain, when the child has acquired
‘ more ſtrength. Proper attention, for a
‘ certain time, will be abſolutely receſſary,
‘ in order to give ſecurity to the advantages
‘ he has gained.’

‘ JOHN PEARSON, *Surgeon.*’

It was with much ſatisfaction I received this opinion from Mr. PEARSON, as it exactly coincided with that which I had previouſly given of the caſe. I then deſired Mr. LYNCH to determine whether he would take the child home, with ſuch inſtructions as I thought neceſſary to give for his future ſafety; or leave him in London, where he might be under my obſervation: he very properly choſe the latter.

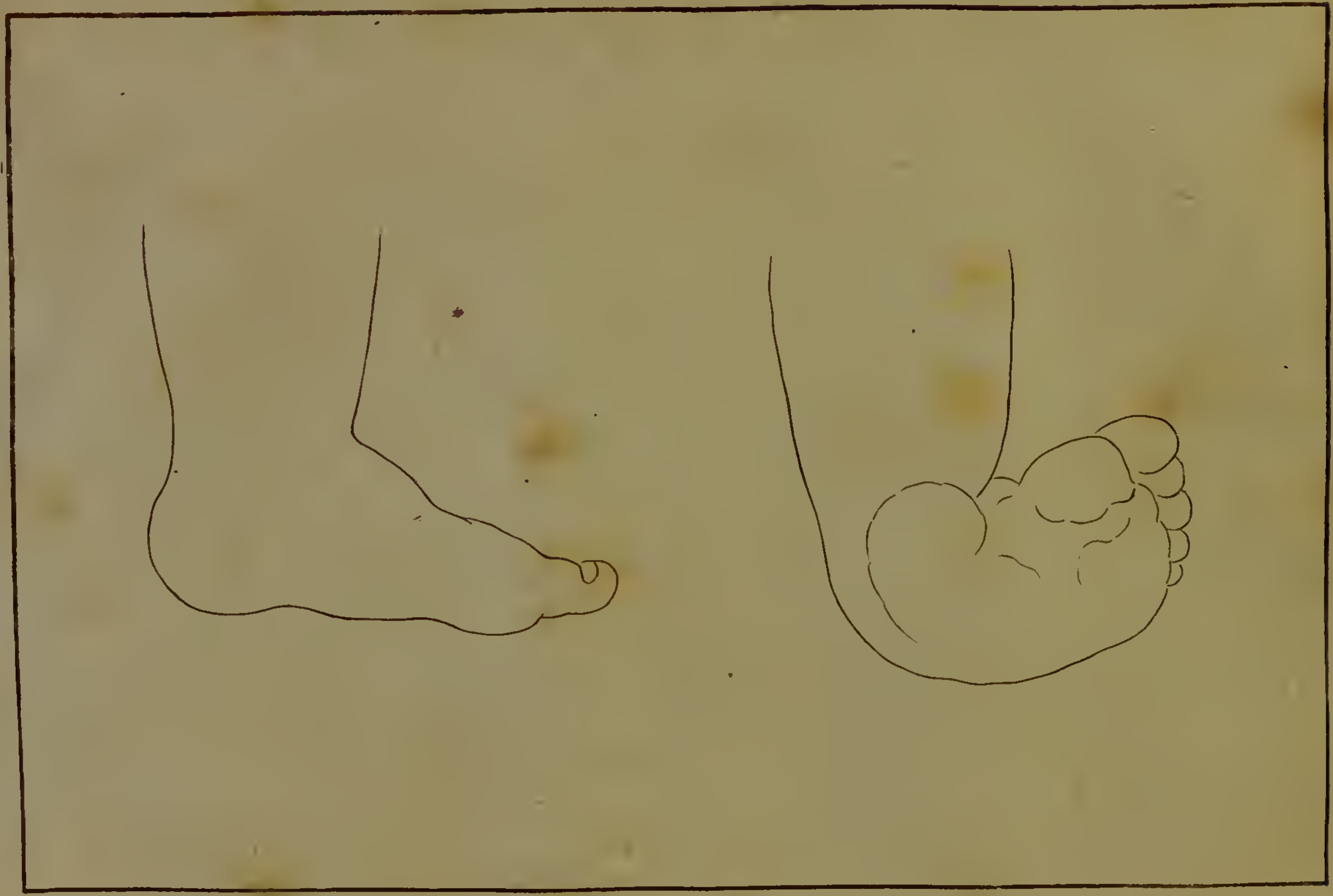
I was then going a journey, which would prevent me from ſeeing him almoſt two months. The only circumſtance that required attention was want of power in the peroneii muſcles, and which could only be obtained by keeping the feet bound, for a length of time, in a proper poſition, as will be more fully explained in my general obſervations. The means I uſe for this purpoſe are ſimple; the nurſe had continually ſeen me apply them; ſhe had been remarkably careful of the child, and was willing to do every thing in her power to ſerve him: this was, therefore, a fair opportunity to determine, how far it would be ſafe to leave a child, after his feet were reduced to the natural form, and before they had acquired their full ſtrength; to the management of a perſon, unacquainted with the true ſtate of the parts: as the means to be uſed for keeping them well are ſo ſimple, that moſt people who ſee them applied are apt to ſuppoſe themſelves able to do it effectually. I, therefore, after giving her every inſtruction that was poſſible, left him in her care, with as much confidence as the nature of the caſe would admit.

When I ſaw him, after my return, it was evident the feet were weaker, and farther from their natural ſtate than they were three months before; I therefore took him again under my care, and in leſs than a month, again brought them into the ſtate deſcribed by Mr. Pearson. He continued mending ever ſince, till he became perfectly well.

I have annexed a view, in its preſent ſtate, of that foot which had been previouſly drawn when deformed.

The general circumſtances of this caſe will be accounted for in another place; here, I would infer from it, the neceſſity of attending to the feet of children, who have not been cured at the earlieſt period of life, *after they have been perfectly reduced to their natural form*, and until they can walk, in every reſpect, firmly, without any aſſiſtance, or poſſibility of relapſing. I would, likewiſe, infer, that there is little probability, that this attention can be effectually given by any, who are not profeſſionally and practically acquainted with the ſubject. It will not, perhaps, be advancing too much to ſay, that if this child had been removed from my care ſoon after Mr. Pearson ſaw him, he would have relapſed into

Pl:3.



into the ſame condition, however careful the nurſe or parents might have been to prevent it; and that relapſe would have been imputed to the imperfection of my method of cure; but as he is, it is a compleat proof, that this deformity may be perfectly eradicated.

## CASE III.

A Daughter of Mrs. Jones, Ruſh-Green, Lewiſham, was born with one club-foot, and, by Mr. Davies, Surgeon, at Lewiſham, was referred to me.

November 8th, 1796, when ſhe was about two months old, this child was put under my care. The foot was, in ſome degree, flexible, and exactly reſembled the annexed figure (*Pl.* III.) but the moſt remarkable circumſtance of this caſe was, the ſituation of the foot, with reſpect to the leg, as the aſtragalus formed a moſt acute angle with the bones it was articulated with, inſomuch that if the child had then been placed on its feet, the end of the fibula would almoſt have touched the ground. My uſual method of treatment was purſued; but, from the inconvenience of bringing the child to me in town, it was almoſt three months before the foot was ſo far well, as to enable me to diſcontinue my attention.

As every circumſtance of this caſe was favorable to the attempt, I reſolved to aſcertain, whether there was any danger of relapſe, when theſe feet had been cured in early infancy, and left without bandages, before the child was of age to walk. When the foot ſeemed perfectly well, I took away all the bandages, and it appeared to retain its poſition, and all its powers, as well as the other foot; but at the end of a fortnight, it appeared to relax a little: I, therefore, applied bandages, to ſecure it in its proper poſition for another month: they were again removed, and it was more than a month, before any tendency to relaxation appeared. Bandages were again applied for two months, and removed a third time: the child was then able to ſtand, and walk imperfectly when held;

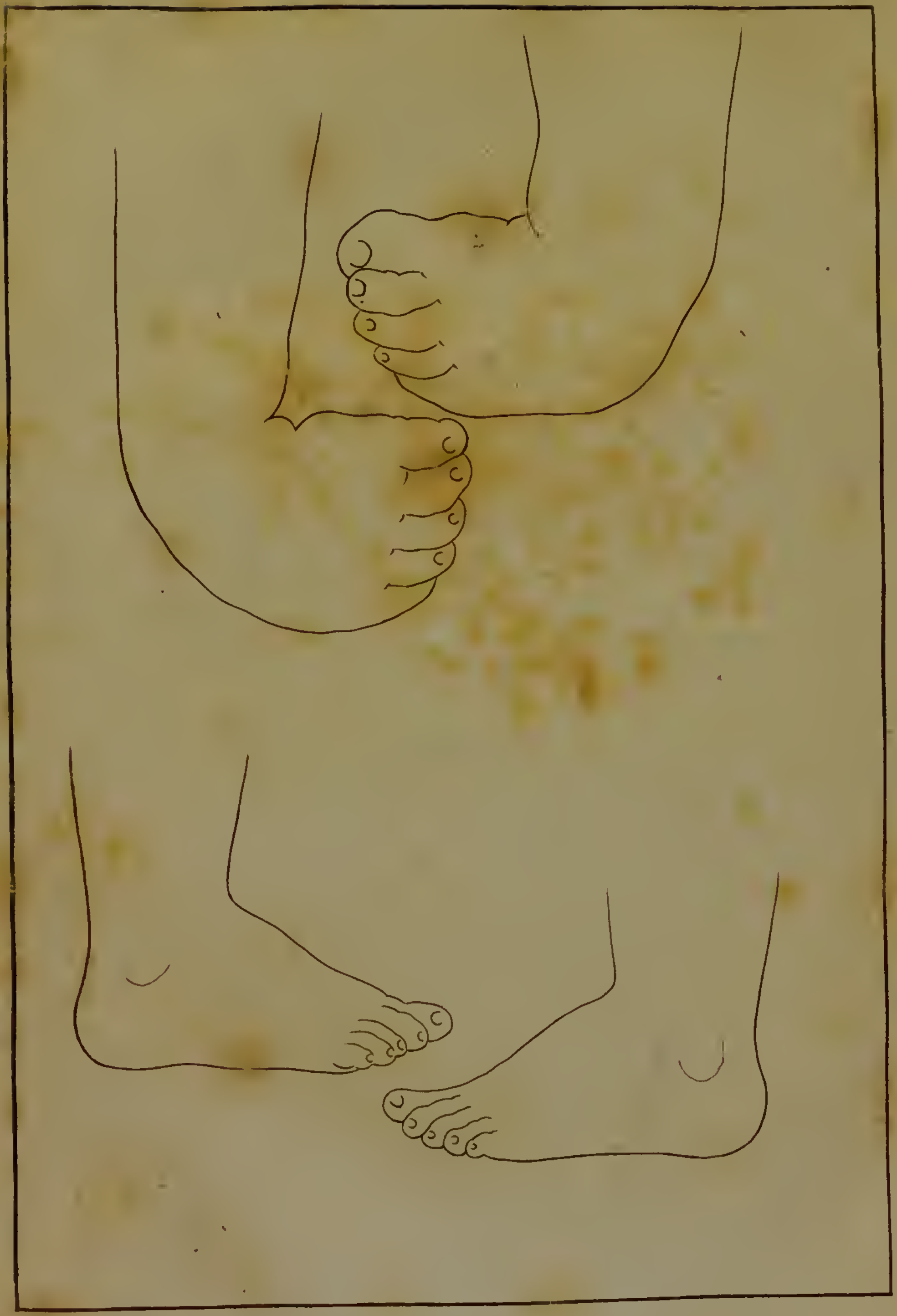
ſhe ſtood as evenly and firmly on this, as on the other foot; but after ſome time, when not ſtanding, the foot ſeemed to tend a little towards its former poſition; I therefore finally determined to keep it properly bound, till the child walks alone, towards which period ſhe is advancing, as faſt as any child of her age can be expected to do.

Caſes like this, where only one foot was affected, are beſt calculated to prove what can be done towards a perfect cure; becauſe the foot which has not been affected, and in the natural ſtate, would be perfectly ſimilar, will always afford, by compariſon, a certain proof of the progreſs that has been made. This caſe ſeems to prove, that though ſuch deformities may certainly be cured in a ſhort time, during early infancy, it will often be neceſſary, and therefore always prudent, to keep ſuch feet reſtrained to their natural poſition, till the patient is able to walk alone. From whence this tendency to relapſe arrives, will be diſcuſſed in another place; I ſhall, therefore, refer to the general obſervations on this deformity, for farther information on the ſubject.

As Mr. Davies ſaw this child occaſionally during the progreſs of the cure, I have added his opinion on the ſubject. I have, likewiſe, given one view of the foot, before it was cured, and another repreſenting its preſent ſtate (*Pl.* III.)

'The above caſe, ſo accurately deſcrib-
'ed by Mr. Sheldrake, was one of the
'moſt complete of *club-foot* that ever came
'under my obſervation; the perfect cure
'of which muſt ſpeak highly in favor of
'the mode of treatment made uſe of in
'remedying this dreadful deformity. The
'child, from being a cripple, now makes
'uſe of that foot, in every reſpect, as well
'as the other; and will, I doubt not, walk
'as free from lameneſs, as if it never had
'been affected. Having witneſſed the
'whole progreſs of the cure, it is but
'juſtice to ſay, the means applied appear
'to me the beſt adapted, the moſt certain,
'and

*Pl. I.*



‘ and expeditious in their effect, of any
‘ I have ever ſeen or heard of.

‘ M. DAVIES.

‘ Lewiſham,
‘ Auguſt 2d 1797.’

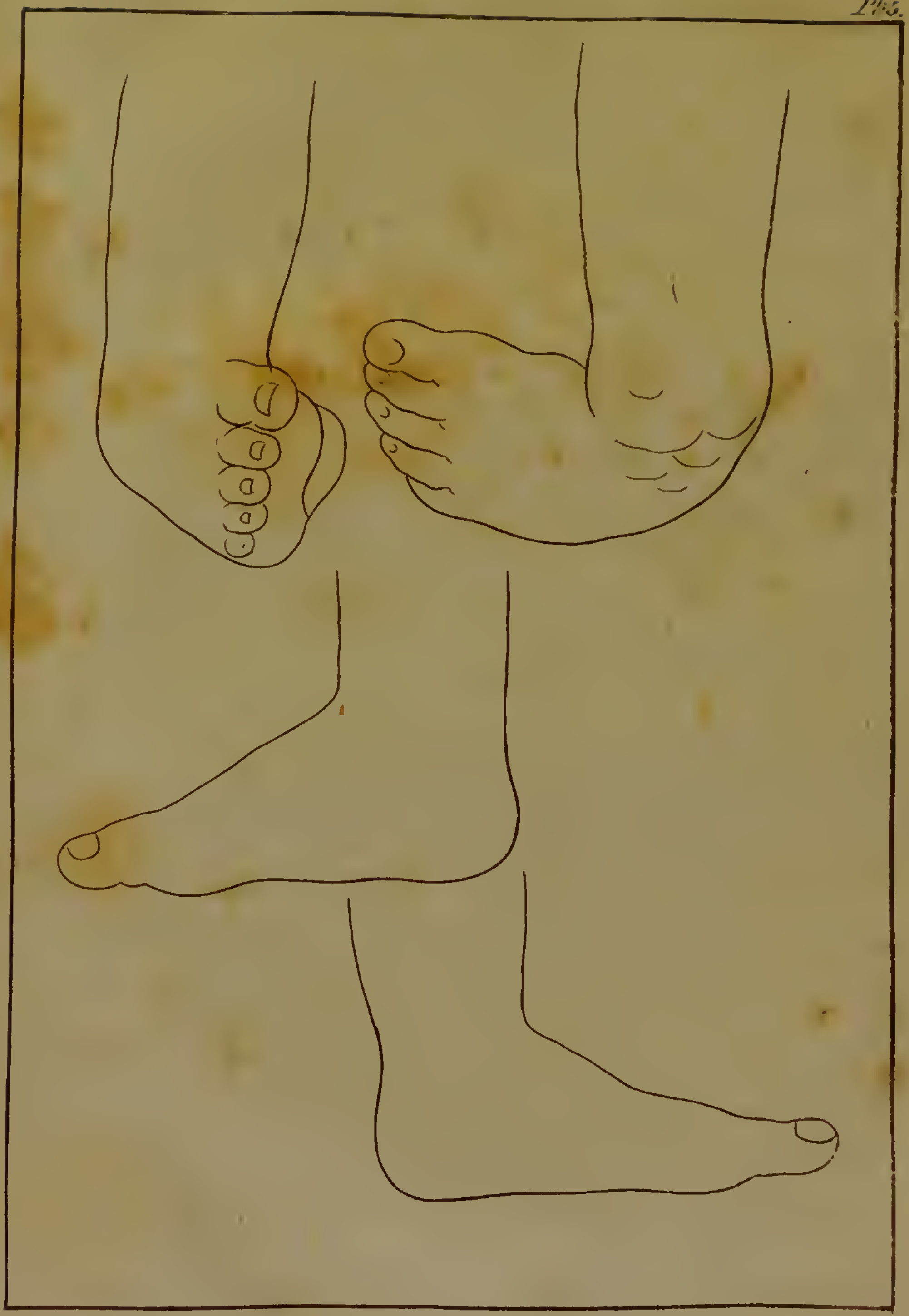
## CASE IV.

February 13th, 1797, Mr. PORTER, Surgeon, Tottenham-Court Road, deſired me to ſee the Daughter of a Gentleman in his neighbourhood, who was born with two club-feet. The child was a few days old; (the appearance of both her feet is correctly repreſented in the annexed *Pl.* IV.) both were, in ſome degree, flexible, but the right was the moſt rigid; the deformity was principally confined to the bones of the tarſus; the aſtragalus, particularly of the right foot, formed a moſt acute angle with the bones of the leg, inſomuch that the cavity between them could be compleatly felt on applying the finger; the os cuboides, &c. likewiſe formed an acute angle with the aſtragalus, and the cavity between *them* was equally perceptible; but there was little diſtortion in the toes. The left foot was ſimilar; but not ſo much deformed as the right.

As there was no reaſon to doubt of ſucceſs in this caſe, the child was fully confided to my care. As my uſual method of treatment was followed, and no inconvenience occurred during the progreſs of the cure, it is only neceſſary to add, that in about two months, the feet were perfectly reduced to their natural form; but as there was an evident neceſſity for continuing the uſe of bandages, they were applied for two months longer. At the end of this time, the feet ſeemed perfectly well; the bandages were therefore diſcontinued. Soon afterwards, ſhe was inoculated for the ſmall pox, from which, in due time, ſhe recovered; but, in about two months, ſhewing occaſional ſigns of weakneſs, it was determined to continue the bandages till ſhe was able to walk alone.

I have added a repreſentation of the feet, at the preſent time, and the opinion of Mr. PORTER, who ſaw the child, occaſionally,

Pl. 5.



caſionally, during the time of my attendance.

‘ Sir,

‘ Having been witneſs to the cure, as
‘ above related, which you have given with
‘ correctneſs, I hold it incumbent on me,
‘ to acknowledge your ſuperior judgment
‘ in the management of deformity, ariſing
‘ from misſhapen bones. Indeed it would
‘ be injuſtice to your ſkill, did I not de-
‘ clare, I ſhall prefer your direction and
‘ mode of treatment, to any perſon I have,
‘ as yet, ſeen or heard of.

‘ I am, Sir,

‘ Your very humble ſervant,

‘ Robert Porter.’

‘ Tottenham-Court
‘ Road.

## CASE V.

A Gentleman in the county of Clare, was deſirous of putting under my care, one of his ſons, who was born with diſtorted feet. From the account tranſmitted to me, I believed they were curable; and, as inſuperable obſtacles prevented him from coming to London, it was at length agreed, that I ſhould meet him in Dublin, ſtay with him a ſtipulated time, and then leave him, with ſuch inſtructions as could be given for his future ſecurity.

In conſequence of this determination, I firſt ſaw him, Auguſt 13th 1796. He was then about two years old; a remarkably ſtrong, healthy child; and ſo active, it was with much difficulty he had been kept from walking till my arrival. His feet were ſo much turned in, that the ſoles lay completely againſt each other their whole length. If he had been permitted to go on his feet, in a ſhort time, the external ancles would have been on the ground, and the feet every way proportionably diſtorted. They were both very rigid; but the right, both in point of form and rigidity, was much worſe than its companion. The annexed figures, (*Pl.* V.) perfectly repreſent their appearance at this time.

I immediately began to reduce them, by the proceſs I have already deſcribed in other caſes; and proceeded ſo much more rapidly than I expected, that before the end of two months, the feet were perfectly reduced to their natural form. They were eaſily kept in that form, by the inſtruments I applied for that purpoſe; and in this condition he could walk about with much activity, either in the go-cart, or holding by the hand of an attendant; ſo that no doubt could be entertained, that he would recover the perfect uſe of his legs, if due care was taken to preſerve him in the ſtate I had now placed him.

I cannot ſufficiently regret the circumſtances that forced me to loſe ſight of this child, before he was placed beyond the poſſibility of relapſing towards his former ſtate. But it was neceſſary I ſhould return; he could not be ſent with me; all that could therefore be done, after having placed him in a ſituation much better than his family expected to ſee him, was to give the beſt inſtructions that were practicable, to enable his attendants to preſerve the advantages that had been gained.

It muſt be remarked, that as the age of the patient, the degree of the deformity, and the limited time I was to ſtay, were all unfavourable circumſtances. I was ſtimulated to make every exertion poſſible, conſiſtently with thoſe circumſtances, to effect a cure: I therefore proceeded, as rapidly as I could with ſafety, to reduce the feet to their natural form; and had the ſatisfaction to ſucceed, without any inconvenience, in leſs than two months. But this proceeding left the feet peculiarly weak; the muſcles had not gained their natural power; it therefore required particular attention to keep them in their proper poſition, till that ſtrength was obtained. Having provided for this attention, as well as our relative ſituations would admit, I was permitted to take my leave.

Upon comparing this caſe with Maſter Lynch's it will be evident, that the greater deformity, as well as more advanced age of the patient, were unfavourable circumſtances; yet the event in each was the ſame: the feet were reduced to their natural form; nothing farther was neceſſary (to uſe Mr. PEARSON's expreſſion) than certain attentions, to preſerve the advantages that had been gained. Maſter LYNCH was permitted to remain under my obſervation, till thoſe attentions were no longer neceſſary, and he became perfectly well, and had the complete uſe of his feet, in every reſpect: this child was removed from my obſervation; of courſe the ſubſequent attention was to be paid by thoſe who had, no doubt, equal inclination to do him juſtice, but certainly not equal experience with myſelf. Could he have been permitted to remain with me, there is no doubt that the cure would have been perfectly complete; but, at preſent, I have no authority to ſay it is ſo. I have ſince been informed, he continues to walk with the inſtruments I ſupplied him with; but his feet are not ſo perfect in appearance as they were at the time I left him. The annexed (*Pl.*V.) repreſents the original ſtate of the diſeaſe, and the appearance of his feet at the time I ceaſed to attend him.

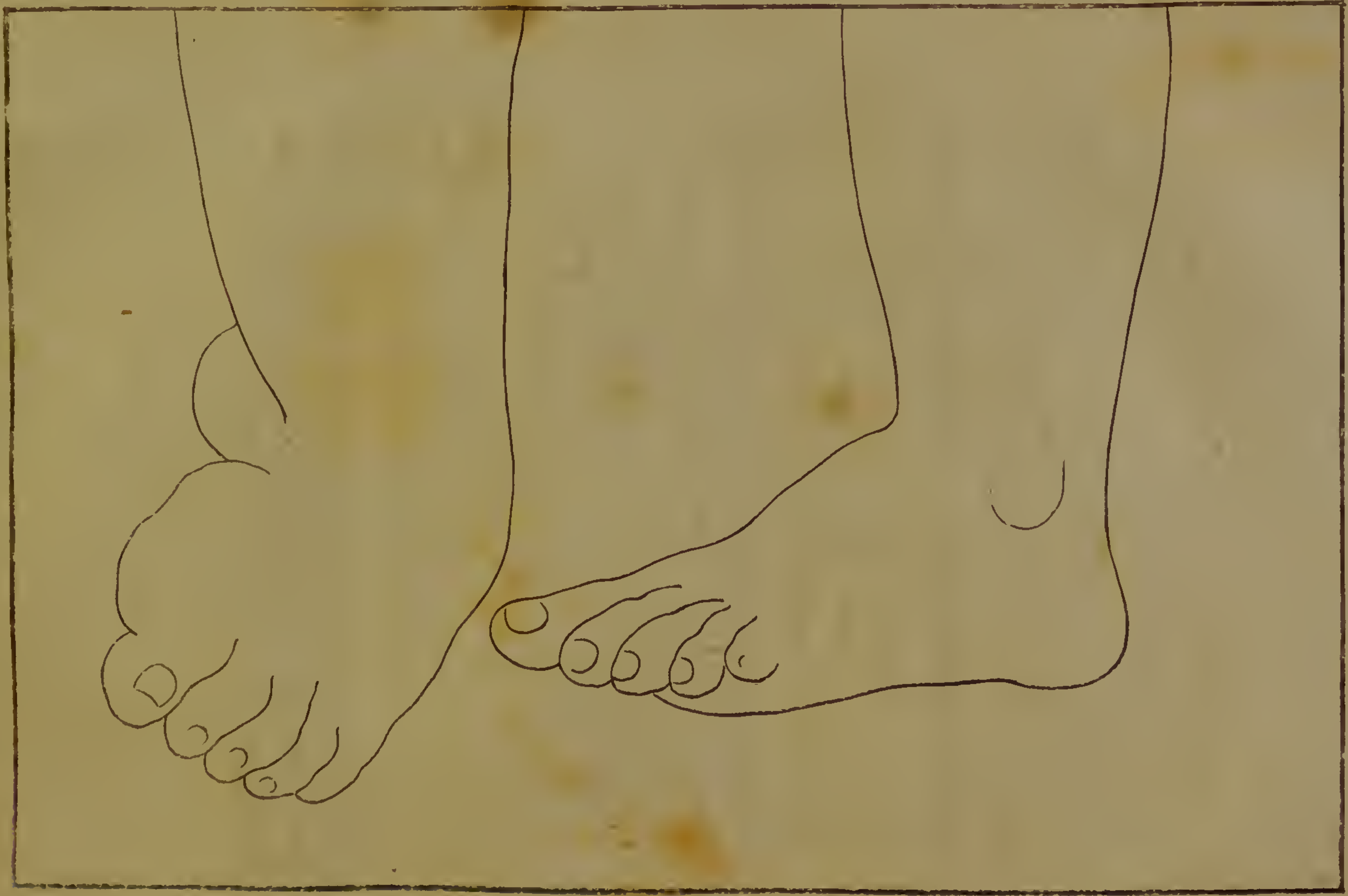
## CASE VI.

The Son of a Gentleman at Dunſtable was born with one club-foot. A Surgeon in that neighbourhood directed ſuch applications as are commonly made uſe of, but without the leaſt ſucceſs; whence it was preſumed, the foot was incurable, and ſuffered to take its own courſe.

When he was about ſixteen months old, his father conſulted me. The child was to appearance healthy; and as the diſtortion had been thought irremediable, ſhoes had been put on, and he had been ſuffered to uſe his feet ſo much, that he was almoſt ready to go alone. As there was reaſon to believe him ſtill curable, my opinion was given to that effect, and it was determined to put him under my care.

In conſequence of his getting the ſmall-

Pl: 6.



pox, with ſome unfavourable circumſtances, he was not put under my care till April 2, 1796; at which time he was nineteen months old. Notwithſtanding his age, notwithſtanding the ſcrophulous diſpoſition had ſhewn itſelf after the ſmall-pox, in a way that induced me to think the neceſſary degree of preſſure *might* produce diſagreeable ſores, the cure went rapidly on, without any unpleaſant circumſtance till May 25th, when his foot was reduced to the natural form.

As the parents ſeemed to feel all the inconveniencies of keeping this child long at ſuch a diſtance from home, and were unwilling that I ſhould attend him longer than was abſolutely neceſſary, it was agreed, that ſo ſoon as the foot was reduced to its natural form, the child ſhould be removed from my care, with proper bandages and inſtructions to keep it ſo; but when that was effected, they reſolved to leave it under my obſervation, till it was perfectly well. To ſave the trouble of my attendance, the child was to be brought to me. The conſequence was ſuch as is always to be expected under theſe circumſtances; I had no controul over the nurſe; the parents were at a diſtance, and ſhe brought the child whenever ſhe thought proper; which inſtead of once or twice a week, as I directed, was once in three or four weeks, and at others once in as many months; in the intermediate time, ſhe did with him as ſhe thought proper. If any thing is to be thought ſurprizing in this caſe, it is, that any benefit could be derived from any mode of treatment ſo followed; yet the foot continued to preſerve its form, and the child obtained the uſe of it, though by no means ſo perfectly, and ſo ſoon, as if it had been properly taken care of.

When he was finally removed from my obſervation, the foot had perfectly regained its natural form; he ſtood and walked as well upon that foot as on the other; but when he was not ſtanding upon it, there remained a little debility in the peroneus longus, which I have always ſeen removed by continuing the bandages. Directions were given to that effect, and the foot is now well.

Every one who ſees adults with club-feet, is ſenſible that the legs, as well as the feet, are leſs than the legs and the feet of people of equal ſize, who do not labour under that deformity; and if a man has one club-foot, *that* leg is always ſmaller than the other: whence it has been argued, that this diſeaſe is originally a malformation of all the parts, and therefore, not to be remedied. This queſtion will be fully examined in another place; it is here to be obſerved, that this child was large of his age; and as there was an evident difference in the ſize of his legs at the time he was put under my care, I aſcertained, by meaſurement, that the diſtorted leg was half an inch leſs in circumference than its fellow. At the time I loſt ſight of him, they were exactly the ſame ſize.

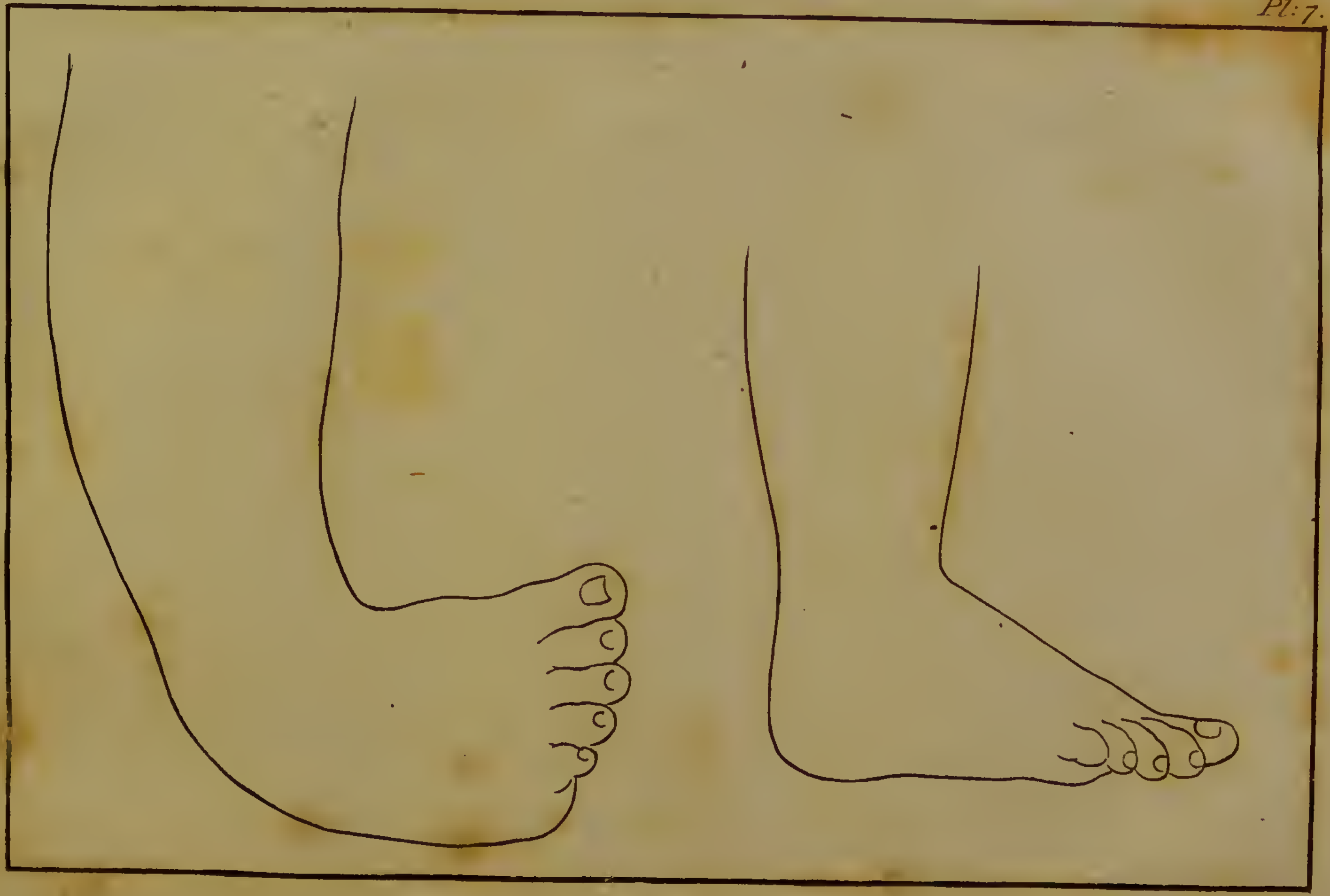
I have annexed two views (*Pl.* VI.) of this leg, one in its original, the other in its improved ſtate.

## CASE VII.

During my viſit to Dublin, 1796, a Gentleman from Wexford put his ſon under my care. The child was above a month old, and had the right foot conſiderably diſtorted. The bones of the leg were ſtrait; but the foot bent inwards, ſo that the ſuperior part of the aſtragalus, which ſhould have been joined with the leg, was perceptibly on the outſide, and the whole foot was exactly as repreſented in the annexed Figure (*Pl.* VII.): it was perfectly rigid, and to appearance, incapable of any motion. As nothing particular occurred during the cure, it may be ſufficient to add, that in ſomething more than three weeks, the foot was reduced to its natural form; and when the child was removed from my care, I requeſted the parent to give his opinion of what had been done, which he did in the following terms:

‘ In conſequence of my child having a ‘ turn in his foot, I came up to Dublin, ‘ from

Pl: 7.



‘ from Wexford, and applied to Mr. SHEL-
‘ DRAKE, the 7th of September, who under-
‘ took to cure it. I now certify, that in the
‘ courſe of twenty-three days, he made *a per-*
‘ *fect cure* of it. The annexed, No. 1, is the
‘ draft of the child’s foot when I applied to
‘ him, and now the foot is as the draft,
‘ No. 2. And, during the whole time it
‘ was under his care, I can teſtify, that the
‘ child was not in the leaſt pain, nor never
‘ was diſturbed more than if dreſſing or un-
‘ dreſſing.’

‘ Signed, &c.

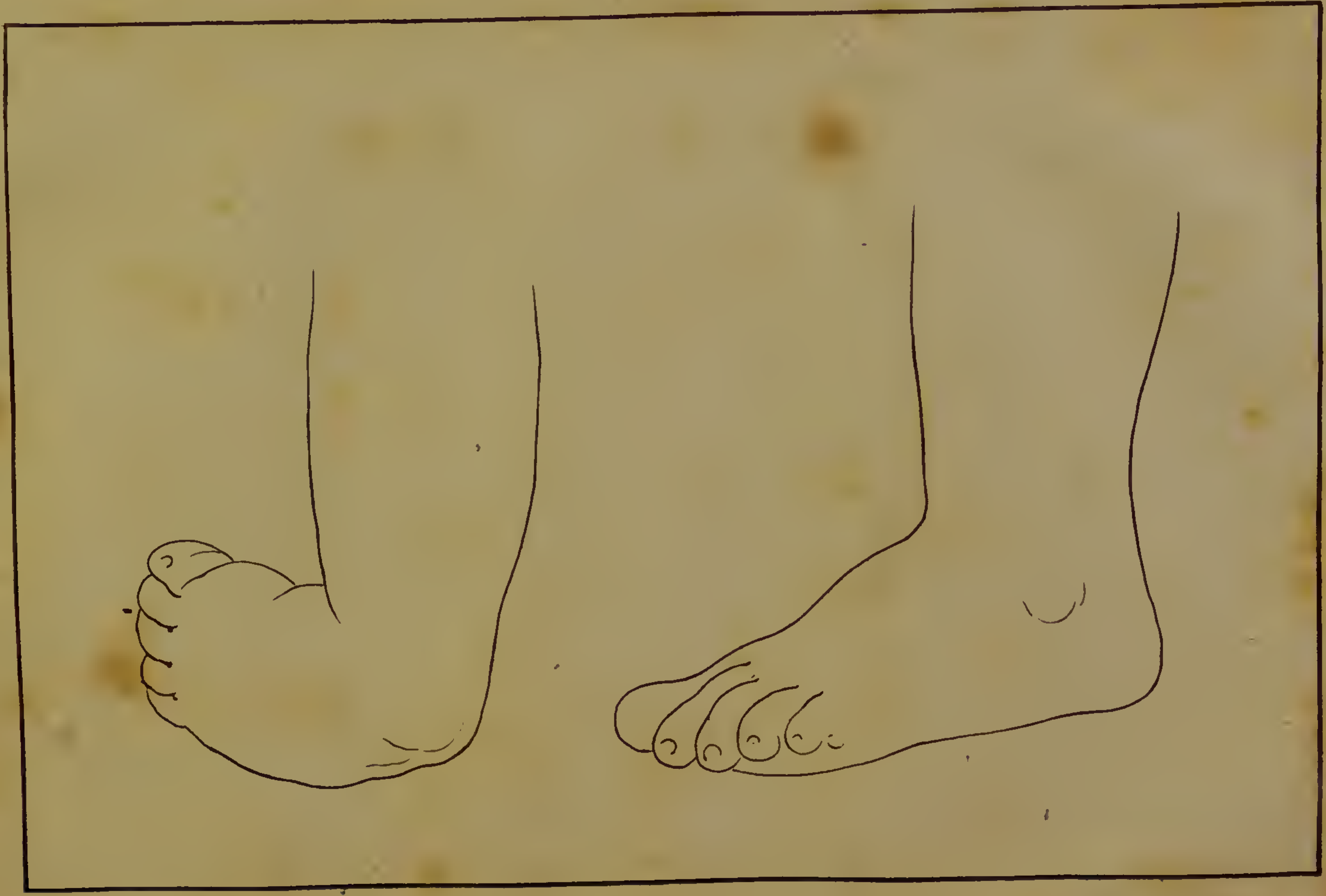
‘ Dublin,
‘ 30th September, 1796.’

It is incumbent on me to add, that when I aſk any Gentleman for a written opinion on ſuch an occaſion, I wiſh it ſhould convey his unbiaſſed ſenſe of the caſe. Such was my conduct on this occaſion; but it is neceſſary to add, that the expreſſion, a *perfect cure*, muſt be underſtood to mean, that the foot was perfectly reduced to its natural form in that time. There was remaining that degree of debility in the muſcles, which always does remain, and requires attention for ſome time afterwards to remove. As it was inconſiſtent with my ſituation, as well as his, that the child ſhould remain *ſo* long under my care, it was agreed, that I ſhould give bandages and inſtructions to keep the foot in order, till it was out of danger of a relapſe. I did ſo, requeſting that, if any untoward circumſtance ſhould happen, I might be informed of it, in order to remedy it if poſſible; but as I have never heard of it ſince, I have good reaſon to preſume the child perfectly recovered.

## CASE VIII.

In Auguſt, 1797, Mr. Kenny, Uſher's Quay, Dublin, deſired me to ſee one of his children. It was then three months old; and had been born with the left foot clubbed, as repreſented in the annexed (*Pl.* VIII.) It had been put to nurſe in the country, and from neglect, reduced to the loweſt ſtate of exiſtence: it was covered with a cutaneous eruption, and had many large ſores in different parts of the body. Had ſuch an object

Pl: 8.



ject been preſented to me, in the ordinary courſe of buſineſs, I ſhould have refuſed to do any thing with him, until his health was re-eſtabliſhed; for, as there ſeemed to be little probability that he would live, it might, in caſe of death, have been ſaid, by ignorant or malevolent people, that my operations had haſtened, if not actually occaſioned that event. But as my ſtay in Ireland was neceſſarily limited, and, in caſe his health was reinſtated, there was no other chance of getting his foot cured, Mr. K. was very deſirous I ſhould make the attempt. As there were two large ſores on that part of the leg my bandages were to be fixed on, I requeſted to know, from the Gentleman who attended the child, if he thought the neceſſary degree of preſſure would be productive of bad conſequences? to which I was anſwered in the negative. I then, from motives of perſonal ſafety, aſked if the eruption I ſaw was not the itch? in anſwer to which I was told, Mr. —— ſaid it would come to be the itch, if not cured in time. Theſe anſwers, and other circumſtances, convinced me that caution, on every account, was neceſſary;

I, therefore, propoſed that the child ſhould be ſhewn, to aſcertain its preſent condition, to any eminent ſurgeon in Dublin ; that it ſhould then be put under my care, I engaging, during my ſtay, to reduce the foot to its natural form ; and when I had done ſo, the child was, upon my requiſition, to be ſhewn to the Gentleman who had previouſly ſeen him, and upon his confirming my opinion, my attendance was to be at an end : but as I well knew there was danger of ſuch a foot, under theſe circumſtances, relapſing, I was to leave a proper bandage, with inſtructions neceſſary for his ſecurity. This plan was agreed on, and the neceſſary ſteps taken in conſequence.

I immediately began my operations, having due regard to the feeble ſtate of my patient. By the care and ſkill of Mr. ——, he gradually recovered his health ; and, by the proceſs I have already detailed in other caſes, in about ſix weeks the foot was perfectly reduced to its natural form. I then requeſted, that the examination, previouſly agreed on, might be made ; but Mr. K. declared,

clared, *he* thought it unneceſſary, as he was perfectly ſatisfied with *my opinion.* I continued to ſee the child, occaſionally, for a fortnight longer, when I took off all my bandages, and made a drawing, to repreſent the *appearance of the foot at that time.* As I had not lately ſeen Mr. K., though frequently at his houſe, I wrote to inform him of my intended departure, and requeſted an interview, which he deferred to the laſt hour of my intended ſtay in Dublin; and then, to my great ſurprize, conſtituted himſelf judge of the caſe, declared he was afraid the child might *relapſe*, and, in that caſe, he ſhould ſend him to be under my care in London.

On my afterwards preſſing him, by letter, on the ſubject, I received evaſive and contradictory anſwers. 1ſt. Mr. K. ſaid, the foot was not then well. 2d. The *nurſe* ſaid, the foot is growing better; and another boot, as he is pleaſed to call it, will compleat the cure. And at laſt, *five months after my leaving Dublin*, Mr. K's opinion was formally tranſmitted to me, ſtating, that he

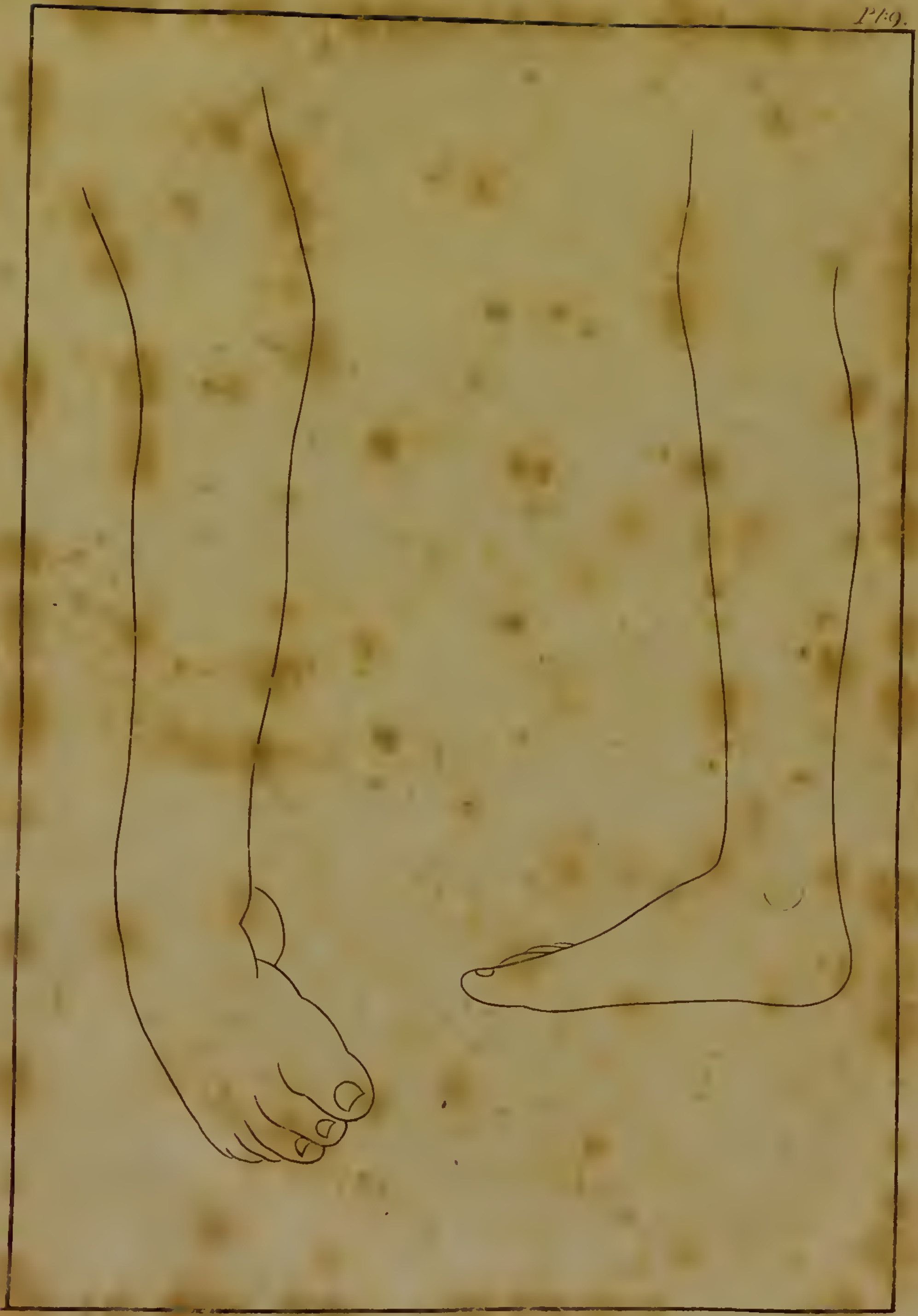
thought

thought the child's foot was not then well.

It will eaſily be ſeen, that I have no means of aſcertaining the facts of this caſe (after I loſt ſight of it) in a ſatisfactory manner. It will therefore be ſufficient to obſerve, that as it got well in as ſhort a time as any other child of the ſame age has done, notwithſtanding there were two running ſores, each as large as a half-crown, immediately under the bandages, that thoſe bandages produced no inconvenience to the child, and that thoſe ſores healed as ſoon as ſimilar ones, in different parts of the body, in conſequence of medicines given by the Gentleman who had the care of his health, it is to be conſidered as a ſtrong proof, that the method I have invented for curing this deformity, may be practiſed with ſucceſs, in many caſes that are very unpromiſing to appearance.

As I have no poſitive information concerning the preſent ſtate of this child, I have only to obſerve, that he has either got perfectly well,

Pl. 9.



well, by keeping the foot bound as I directed, or that, in conſequence of neglecting that precaution, he has relapſed, in ſome degree, towards his former ſituation. If the wretched condition I firſt ſaw him in is conſidered, and if it is conſidered too that he was continued with the ſame nurſe that brought him into that ſituation, his recovery might juſtly be called a miracle: but whoever reflects on the circumſtances of Mr. K. evading the propoſed examination, while I was preſent, and even not chuſing to ſend me, in a ſatisfactory and regular manner, till after the expiration of five months, the opinion of the Gentleman who was to examine him, will conclude with me, that the child continued well for ſome time after my departure, and then, from miſmanagement, or other cauſes, has perhaps deviated, in ſome degree, from that ſituation.

## CASE IX.

July 12, 1797, Mrs. PAWSEY, Mary-le-bone Street, conſulted me about her ſon, of whom ſhe gave the following account.

count. He was three years old, was born ſtraight, and had been healthy, in every reſpect, till the age of fourteen months, when he had a ſevere fit of illneſs, and, in conſequence, was ſo much debilitated, that he ſeemed to have loſt the uſe of all his limbs. From this condition he recovered gradually, except that a ſmall degree of weakneſs remained in his right foot: this increaſed, and the foot progreſſively turned inwards, till it became as repreſented in the annexed (*Pl.* IX.) She was adviſed to try the common leg-irons, which ſhe procured to be made by a relation of mine. No benefit was derived from the uſe of them; and after repeated alterations, during eighteen months, he candidly acknowledged, he could not make them do better; and as no benefit had been derived from the uſe of theſe things, *he* knew of nothing elſe that could be of ſervice to the child. She then conſulted Mr. Cruikshank, who recommended her to me.

At this time, the foot was not only diſtorted, as repreſented in the Plate, but both the knees were bent inwards, in conſequence of diſtortion in the foot. The foot, however, was the principal object of attention; in ſomething leſs than two months it was ſo far reduced to its natural ſtate, that it could be placed in the natural poſition; from which the ſecond figure, in the annexed Plate, was drawn: the knees were likewiſe attended to, and, in five months, were perfectly reſtored to their natural ſtate; the foot, however, remains extremely weak, and muſt be ſo a long time before it recovers its natural powers. This is one of thoſe caſes which prove, that much deformity, and of the worſt kind, may ariſe from circumſtances apparently trivial. It proves too, that the application of the things commonly called leg-irons, is of no uſe in theſe caſes, except to amuſe the parents, by ſeeming to do ſomething to relieve, while the diſeaſe may proceed, almoſt as rapidly as if left to itſelf: for there can be no doubt, that if a proper method had been adopted at firſt, the foot might have been cured in a few months, and the knees not have been diſtorted; but, from the wretched management of this caſe, during ſo long a time, the foot was ſo much debilitated, that it will require the conſtant attention of a year or more, before it can be perfectly reſtored to its natural ſtate.

## CASE X.

In July, 1797, Mr. Farr, Surgeon, at Dunſtable, in conſequence of having ſeen the child of a Gentleman at that place, who had been under my care, (vide Caſe VI.) conſulted me about a patient of his, who was in a ſimilar ſituation; and, in conſequence of my advice, he was brought to town, and put under my care. September 13th I firſt ſaw him: he was about ſeven months old; the left foot had been diſtorted before the birth, and no attempt had been made to relieve it. In appearance, and every other circumſtance, it ſo exactly reſembled the 7th Caſe in this work, that I thought it would be unneceſſary to engrave my drawings of this.

The cure went rapidly on, and without the leaſt untoward circumſtance, till the 21ſt of October, when the foot was perfectly reduced to its natural form. I wiſhed to have him longer within my obſervation; but as it was inconvenient for the parents to be from home, they therefore determined to remove him, taking precautionary bandages, to prevent a relapſe. Theſe were to be applied, under the inſpection of Mr. Farr, to whom I communicated the neceſſary information, and afterwards received the following opinion reſpecting the caſe.

'Sir,

'I hope you will have the goodneſs to 'excuſe my not anſwering your letter ſooner, as I happened to be from home when 'Mrs. ——— called upon me, and their 'living ſome diſtance, prevented me from 'ſeeing the child ſo ſoon as I wiſhed. I have 'carefully inſpected the child's foot, and 'am extremely happy in ſaying, that I 'think it a caſe that will do you great credit, as I have not the leaſt doubt, from the 'appearance of it, but the child will be

‘ perfectly free from any deformity. You ‘ may depend on my ſtrictly attending to ‘ the directions laid down; and ſhall, at all ‘ times, be happy in recommending you to ‘ any caſe that may fall under my care or ‘ knowledge.

‘ I am, Sir,
‘ Yours, &c.
‘ CHARLES FARR.’

‘ Dunſtable,
‘ October 29th, 1797.

## CASE XI.

September 11, 1797, Mr. PORTER of Tottenham-Court-Road, ſent me the child of a perſon in that neighbourhood, that had been born with one club-foot. It was about three weeks old at the time I ſaw him, and the foot, in its general appearance, reſembled the laſt caſe.

The ſame method of treatment was purſued for about two months, when it appeared to be quite well; but as the child was within my reach, I continued bandages on the foot for another month, when it appeared ſo well, that I hoped there could be no farther occaſion to make uſe of them.

In about a month, however, the foot ſeemed to relax towards its former poſition; I therefore again applied the neceſſary bandages, with a determination, that they ſhould be continued till the time that the child will be able to walk.

The reſult of this caſe is an additional proof of the opinion I have always been diſpoſed to entertain, that when the foot of a young child has been diſtorted in this manner, it ſhould not be left at liberty, till it is able to walk; as the inequality in the action of the muſcles of the foot, will always give a ſtrong tendency to reſume the diſtorted form, unleſs prevented by proper bandages, till the child walks, when only, it may be ſaid, to be ſecure from a relapſe.

## CASE XII.

In September, 1795, a Lady in Dublin conſulted me, reſpecting her daughter, of whom ſhe gave the following account.

She was then near three years old; ſhe was born with one club-foot, for which nothing had been done for ſome time; but at length a Gentleman, who had acquired ſome vague notions of my method of treatment, undertook to cure it, but in the attempt he produced very high inflammation, ſwelling in the whole limb, and a conſiderable degree of fever, in conſequence; he was, therefore, obliged to deſiſt, until thoſe effects of his operations had ceaſed. His ſucceeding attempts produced the ſame bad conſequence, during almoſt a year that they were continued. It was then propoſed to cure the foot, by partially dividing the tibialis poſticus and gaſtrocnemii muſcles, to the contraction of which the diſtortion was attributed. So inconſiſtent is this idea, with the nature of the diſeaſe, and the propoſed operation ſo little connected with rational ſurgery, that I ſhould deem it improper to be mentioned, if I had not known the ſame operation performed in another caſe, and, as it might be expected, without being productive of the leaſt benefit. This operation was not ſubmitted to, but another Gentleman was conſulted, who, to complete the catalogue of abſurdities, propoſed to cure the foot by eroding the ſuperior parts of it with cauſtic, which by contracting thoſe parts, was to counteract the contraction of the gaſtrocnemii, &c. &c. and thus reduce the foot to its proper form ! ! !

Neither was this ſubmitted to, or any thing elſe done, till I ſaw the child. Upon examination, the deformity appeared ſtrictly confined to the foot; the connection of the aſtragalus, with the bones of the leg, was in its natural ſtate; the bones of the tarſus were much diſtorted, particularly the os cuboides, which projected, apparently, much beyond the reſt; the toes were much turned inwards; and ſhe ſtood directly upon the outſide edge of the foot. As ſhe

could

could now go alone, the defective form and action of the foot had cauſed both knees to bend inwards; and there was reaſon to believe, both deformities would continue to increaſe.

As experience had not, at that time, authoriſed me to ſay, a child of her age could certainly be cured, and as the attempts that had been made in this caſe had been ſo perfectly unſucceſsful, I could not, with propriety, pronounce this child's foot to be curable; and, without ſuch aſſurance, the parents were unwilling to put her under my care for that purpoſe. But the diſtortion of the knees certainly might be cured; it was therefore reſolved to do nothing to the foot, but to do every thing poſſible to remove the diſtortion of the knees; for which purpoſe I prepared the neceſſary inſtruments.

During the enſuing winter, I ſaw caſes, which induced me to believe that this, and many ſimilar caſes at a much later period in life, might be cured. Upon repreſenting this to Mrs. ——, ſhe determined to put her daughter under my care, during my ſtay in Dublin, in the ſummer of 1796. Upon my arrival, I found the curvature of the knees was diminiſhed; but the foot remained, to appearance, in the ſame ſtate as when I ſaw her the preceding year. My operations were immediately begun, and continued unremittingly for two months, without the leaſt inconvenience to the child; and at the end of that time, the foot was ſo far cured, that it could be completely placed in its natural poſition, and had acquired its natural form: but there being a ſuperabundant portion of ſkin on the ſuperior part of the foot, in conſequence of the alteration in its form, and the muſcles which lie in that direction being conſequently weak and incapable of acting in the natural way, it was indiſpenſably neceſſary to bind the foot in its proper poſition, till the neceſſary degree of power was acquired. For this purpoſe, as well as to complete the cure of the diſtortion in the knees, I prepared the neceſſary

inſtru-

inſtruments; and after giving full directions for the uſe them, took my leave.

I have ſince been informed, by letter, that the diſtortion of the knees is perfectly removed; and the foot ſo far recovered, that ſhe has laid aſide the inſtruments, and merely wears a ſtiff ſhoe, which keeps the foot in perfect good order.

## CASE XIII.

In the Summer, 1794, a Gentleman in Dublin deſired me to examine his ſon, then between three and four years old. He had been at nurſe, in the country, with a woman, who ſtrenuouſly denied all knowledge of any accident that could occaſion the ſituation of his foot at that time, which ſhe ſaid became gradually diſtorted, and ſhe was not able to aſcertain when it began.

The right foot was bent upwards and outwards, ſo that, when he ſtood upon it, the little toe could be brought nearly into contact with the fibula, and the end of the tibia almoſt touched the ground; but when he did not ſtand upon it, it fell into its natural ſituation. The father aſſured me, that foot had been as perfect as the other, from the birth till the time he was put to nurſe. The nurſe aſſerted, he had never met with any accident, or complained of pain or uneaſineſs, which he certainly did not do at the time I ſaw him. It ſeemed as if the ligaments, which connected the bones of the foot, had been violently ſtrained or lacerated on the inſide, and the muſcles connected with them, in conſequence, had loſt their power; for he could not direct his foot into any particular poſition, when deſired to do ſo. It is probable, that the cauſe of this, whatever it might be, was concealed intentionally; and it was evident, that no rational attempt could be made, to do more than ſupport the foot, in a poſition that would enable him to walk upon it, nearly in its natural ſituation, and, without ſtraining it more, leave the reſt to nature. This is what I undertook to do; conſtructed an inſtrument for the purpoſe, gave proper directions for the uſe of it, particularly that it ſhould be worn continually, and then took my leave.

In 1795, I ſaw him again. My directions had been implicitly followed; and he had ſo far recovered the uſe of his foot, that, with a little attention, he could walk fairly and evenly upon it, and point the toe in any direction, when deſired; but when going careleſsly, his ancle bent under him, as formerly, but not ſo much as at firſt. As ſo much good had been done by the plan he had followed, and no improvement in it could be ſuggeſted, I adviſed that it ſhould be ſtrictly perſevered in.

In 1796, I again made enquiries after him, and was told by his father, that he was at a conſiderable diſtance in the country, that he had left off the inſtrument, and his foot was perfectly well. As the nurſe's account of the beginning of this diſtortion is certainly not credible, I ſhall ſay nothing on that part of the ſubject; but as I have truly deſcribed the ſituation of this child, at the time I firſt ſaw him, as well as the ſubſequent alteration that took place, I may be permitted to offer ſuch remarks as thoſe circumſtances ſuggeſt.

Were the capſular ligaments lacerated, or only violently ſtrained? As it is difficult to conceive that a child's leg ſhould be ſo injured, as to lacerate the capſular ligaments of the foot, without rendering ſurgical aſſiſtance indiſpenſably neceſſary, which certainly was never obtained, it is not probable, the ligaments were lacerated in this caſe. But the child might get a violent ſtrain, or ſimilar accident, the nurſe might conceal from the knowledge of the parents; and the child might be ſuffered to walk on his foot, already injured and neglected, till all the miſchief took place that has already been deſcribed.

The fact I wiſh to impreſs on the Reader's mind, from the hiſtory of this caſe is, that extenſion of the ligaments, to as great a degree as can poſſibly take place in any club-foot, may be remedied by the efforts of nature, aſſiſted by keeping the foot judiciouſly bound, for a length of time, in a proper poſition, whence it is to be inferred, that no club-foot is to be conſidered as incurable, merely on account of ſuch an extended ſtate of the ligaments.

## CASE XIV.

I HAVE lately been conſulted, concerning a young Lady, of whom the following account was given. She was born, in every reſpect, perfectly ſtraight, and continued ſo till the age of five years, when ſhe had a violent fever, and afterwards loſt the uſe of all her limbs. From this ſtate, ſhe ſeemed to recover ſlowly, except the left foot, which continued weak, and had a tendency to turn inwards. Several gentlemen were conſulted, who ſaid it was only a little weakneſs, which in time would go off of itſelf: but it continued to increaſe; and it was at laſt determined to try a leg-iron, which was procured, and, as is too frequently the caſe on ſimilar occaſions, ſo careleſsly applied, that if it was calculated to do any ſervice, no benefit was obtained from the uſe of it. In this way ſhe went on, from bad to worſe, till the time I ſaw her, when ſhe was ſixteen years of age. The foot was as rigid, and as much deformed, as if it had been ſo from the birth. Conſidering the time this had been coming on, and the alteration that naturally takes place in all the bones of the foot, between the age of five and ſixteen years, there was no reaſon to ſuppoſe it poſſible to cure, or even diminiſh the deformity in this caſe: I therefore contented myſelf with applying a leg-iron, conſtructed in the beſt manner, ſo as to ſupport her, as effectually as poſſible, in her preſent ſituation. I have ſince ſeen her, and find her inſtrument applied in the ſame negligent manner as formerly, and the foot evidently worſe than when I ſaw her firſt.

## CASE XV.

A SHORT time ſince, I was conſulted by a Lady, who gave the following account of herſelf. She was twenty-three years of age, and five years ago, after a ſevere illneſs, ſhe loſt the uſe of one of her hands, and one foot. The hand afterwards recovered: the leg was waſted, flaccid, and, for a time, incapable of voluntary motion; it ſlowly recovered, ſo far as to enable her to walk, with the aſſiſtance of crutches and a leg-iron, which ſhe had very badly conſtructed at Bath; but the foot turned inwards, and became, in every other reſpect, like the common club-foot.

As there remained much flexibility in the foot, and the diſtortion did not commence till after ſhe was eighteen years of age, it did not appear to me, that ſuch an alteration had taken place, in the ſtate of the parts, during thoſe five years, as to preclude the poſſibility of effecting a cure. I have not ſeen or heard of her ſince.

I have related the above caſes as they were deſcribed to me; becauſe it is important, that ſuch facts ſhould be known, as, if they make a proper impreſſion, they tend to preſerve others from ſimilar misfortunes. As the treatment of ſuch caſes has ſeldom been the object of chirurgical attention, the extenſive knowledge and influence of old women, &c. &c. has been allowed to operate in its full force, and undoubtedly been productive of much miſchief. If any perſon of this deſcription, has known one caſe of this kind, the hiſtory of which they really were acquainted with, they generally aſſume, that all others, ſimilar in appearance, have ariſen from the ſame cauſe. As many diſtorted feet certainly become ſo, previous to the birth, a prejudice has very generally been adopted, that it is impoſſible for ſuch diſtortion to take place at any period afterwards. Many caſes, within my knowledge, prove the reverſe of this poſition; but I have ſelected the two already related, to ſhew the falſity of the notion, that a child who has only a little weakneſs in its ancles or knees, will get well, without aſſiſtance, as it grows up; a notion, the indulgence of which has occaſioned the neglect of many a deformity that might have been cured in the beginning, and thus permitted it to become incurable, and made the ſufferer a cripple for life.

## OF THE
## *Circumſtances which render the Club-foot curable, or otherwiſe.*

In my obſervations on diſtortion of the legs of children, I endeavoured to eſtabliſh the following facts; *viz.*

1ſt. That ſpecies of club-foot, with which children are frequently born, may be perfectly cured, provided the cure is undertaken before the child begins to walk.

2d. It is not impoſſible, that many caſes may be perfectly cured, if undertaken after the patient has walked: though this muſt depend upon circumſtances, in particular caſes, which cannot be foreſeen, and therefore was not advanced as a general fact.

3d. If the cure is not attempted till the bones are completely oſſified, it cannot be effected; and, in many caſes, the deformity cannot be alleviated, though the exertions of art may be neceſſary to prevent it from being increaſed.

Whoever has read the preceding caſes, will, perhaps, be diſpoſed to allow the facts above ſtated are now completely demonſtrated; and, if they peruſe the annexed ſpecification of my patent, they will perhaps allow too, that the method I have invented is capable of curing every diſtortion it ſhall be ſkilfully adapted and applied to, provided there is no circumſtance in the caſe which render it phyſically impoſſible that a cure ſhould be effected. Theſe points being ſettled, it only remains to enquire, what circumſtances will, in any caſe, conſtitute an abſolute and inſurmountable impediment to the performance of a cure; and what circumſtances will render a cure uncertain, or otherwiſe. When this has been done with tolerable accuracy, we cannot be much at a loſs, to form a rational prognoſtic on the event of any caſe that may come under examination.

In order to do this, it will be neceſſary to aſcertain what is the difference, in point of form and powers, between the parts affected by the deformity, when in their natural and in their diſeaſed ſtate, and what are the progreſſive alterations which take place in thoſe parts, during their removal from the natural ſtate to that which conſtitutes the diſeaſe; and, *vice verſa*, in all the variety of circumſtances in which it comes before us. And, as in moſt caſes, this diſtortion takes place before the birth, and in many at a time remotely antecedent to that period, it will be neceſſary to begin our enquiries, at leaſt as far back as it is preſumed the diſeaſe originates. This retroſpection, neceſſarily directs our enquiries to the formation of ſome parts of the fœtus, though not of the fœtus itſelf, and induces the neceſſity of mentioning ſome facts which are generally known, and which it would be otherwiſe unneceſſary to mention here, but that it is proper to leave as few circumſtances unnoticed, or to be taken for granted, as the nature of the ſubject will admit.

A reſpectable * author has ſaid, ‘ It is ‘ not eaſy to explain, in their natural order, ‘ the various parts of which the human ‘ body is compoſed ; for they have that ‘ mutual dependence upon each other, that ‘ continual circle of action and re-action ‘ in their various functions, and that in- ‘ tricacy of connection, and cloſe depen- ‘ dence, in reſpect of the individual parts, ‘ that, as in a circle, there is no point of ‘ preference, from which we ſhould begin ‘ to trace its courſe, there is, in the human ‘ body no function ſo inſulated from other ‘ functions, no part ſo independent of ‘ other parts, as to determine our choice. ‘ We cannot begin without heſitation, nor ‘ hope to proceed in any perfect courſe ; ‘ yet, from whatever point we begin, we may ‘ ſo return to that point, as to repreſent ‘ truly this conſent of functions, and con- ‘ nection of parts, by which it is com- ‘ poſed into one perfect whole.’

The application of this opinion to the objects

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* Anatomy of the Bones, Muſcles, &c. by JOHN BELL.

objects of this enquiry is ſo appoſite, that it would be difficult to deviate from it, in any reſpect, without proportionably rendering thoſe objects more obſcure, inſtead of illuſtrating them ; I ſhall, therefore, I truſt, be excuſed for making it the rule for my conduct, in proſecuting this enquiry.

Every one who ſees a club-foot can tell it is a diſtortion, or at leaſt a deviation from the natural ſtate of the limb ; but the anatomiſt, who wiſhes to underſtand the diſeaſe, will endeavour to examine, ſeparately, the ſtate of the bones, the ligaments, and the muſcles, and when he is acquainted with the particular ſtate of all thoſe parts, he will conſider them as combined in one whole, and by this method, will be enabled to form a more correct idea of the diſeaſe, than by any other method he can purſue. I ſhall, for this reaſon, direct my inquiries, to the bones, the ligaments, and the muſcles, in order, beginning with the firſt.

## OF THE BONES.

WHENEVER I have been conſulted on theſe diſtortions of the feet, I have found an idea generally prevail, that the diſeaſe is incurable; but after I have explained the reaſons which induced me to form a different opinion, the probable rectitude of that opinion has been admitted, with this qualification, "if taken *in time*; *for while a child is young, the bones may be eaſily moulded to any ſhape we pleaſe.*" Now, though the bones of young children may eaſily be bent by diſeaſe, or by other cauſes, the concluſions drawn from that axiom, and applied to the deformity in queſtion, muſt lead to falſe ideas of the diſeaſe; for, in the earlieſt periods of life, when the bones are ſofteſt, and of courſe eaſieſt bent, they are not at all affected in feet that have this deformity, of courſe their pliability, real or ſuppoſed, is entirely out of the queſtion: and, when the bones are really deformed, and the perfect cure, conſequently, depends upon altering the form of thoſe bones, they are ſo far advanced in hardneſs, as, in the common opinion, to be incurable. Thus a falſe doctrine is built upon the miſconception of facts, and the conſequence will be, if thoſe facts are not clearly underſtood, that the prevalence of the doctrine founded on them will occaſion many caſes to be neglected, till they are incurable; becauſe it has been believed, they become incurable much ſooner than they really are ſo.

Taking up this ſubject, as I did, when the diſeaſe was believed to be, in its nature, incurable, it became me to be peculiarly cautious of advancing more than I was prepared to prove: I therefore only advanced an opinion, founded on facts within my knowledge, that, as it was not originally occaſioned by malformation of bones, it was certainly curable, in every caſe, before that period at which the malformation of the bones begins, *i. e.* after the * *oſſification is complete.* Succeeding facts have juſtified the propriety of my opinion; they have gone farther, they have proved, that this diſeaſe may be, and has been cured, after a conſiderable degree of malformation of bones muſt have taken place. It is probable, that many more may be cured, when patients are much farther advanced in life; it therefore now becomes neceſſary to examine, by what alteration in the ſtate of the bones ſuch cures can be effected, as well as by what means thoſe effects are to be produced. The powers of the agents will be conſidered in another place; the object at preſent is, to aſcertain, as nearly as poſſible, by what actions of the ſyſtem the form of the bones can be altered; at what period thoſe bones ceaſe to be ſuſceptible of alteration; and what obſtacles may, in any caſe, render the diſeaſe abſolutely incurable.

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* In ſaying '*after the oſſification is complete,*' I allude to that period (about two or three years of age) when the whole of the bones ceaſe to be cartilage, except the extremities, which remain ſo to provide for the future growth of the bones, till he animal arrives at maturity.

To do this, it will be neceſſary to trace the origin and progreſs of the formation of bones, from a very early period, to the time in which they may no longer be ſuſceptible of alteration, in point of form. This I ſhall do, in the words of the Author I have already quoted.

‘ All* the bones in the body, both in ‘ the human fœtus, and in other animals, ‘ are merely cartilage before the time of ‘ birth. The whole fœtus is gelatinous; ‘ the bones are a pure, almoſt a tranſparent ‘ and tremulous jelly; they are flexible, ſo ‘ that a long bone can be bended into a ‘ complete ring; and no opacity, nor ſpot ‘ of oſſification, is ſeen.

‘ This cartilage never is hardened into ‘ bone; but, from the firſt, is an organiſed ‘ maſs. It has its veſſels which are at firſt ‘ tranſparent, but which ſoon dilate; and ‘ whenever the red colour of the blood begins to appear in them, oſſification very ‘ quickly follows, the arteries being ſo far ‘ enlarged, as to carry the coarſer particles ‘ of the blood. The firſt mark of oſſification is an artery, which is ſeen running ‘ into the centre of the jelly, in which the ‘ bone is to be formed. Other arteries ſoon ‘ appear, overtake the firſt, mix with it, and ‘ form a net work of veſſels: then a centre ‘ of oſſification begins, ſtretching its rays ‘ according to the length of the bone, and

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* Anatomy of the Bones, &c. by John Bell.

‘ then the cartilage begins to grow opaque, ‘ yellow, and brittle ; it will no longer bend, ‘ and the ſmall nucleus of oſſification is felt ‘ in the centre of the bone, and when touched by a ſharp point, is eaſily known by its ‘ gritty feel. Other points of oſſification ‘ are ſucceſſively formed. Always the oſſification is foretold by the ſpreading of the ‘ artery, and the arrival of red blood. Every ‘ point of oſſification has its little arteries, ‘ and each oſſifying nucleus has ſo little dependence on the cartilage in which it is ‘ formed, that it is held to it by thoſe arteries only ; and when the oſſifying cartilage ‘ is cut into thin ſlices, and ſteeped in ‘ water till its arteries rot, the nucleus of ‘ oſſification drops ſpontaneouſly from the ‘ cartilage, leaving the cartilage like a ring, ‘ with a ſmooth and regular hole where the ‘ bone lay.

‘ The colour of each part of a bone is ‘ proportioned exactly to the degree in ‘ which its oſſification is advanced. When ‘ oſſification begins in the centre of a bone, ‘ redneſs alſo appears, indicating the pre-

‘ ſence of thoſe veſſels by which the bony
‘ matter is to be poured out. When the
‘ bony matter begins to accumulate, the
‘ red colour of thoſe arteries is obſcured,
‘ the centre of the bone becomes yellow or
‘ white, and the colour removes towards
‘ the ends of the bone.

‘ In the centre of the firſt colouring of
‘ the bone is a cloudy, diffuſed, and general
‘ red, becauſe the veſſels are profuſe. Be-
‘ yond that, at the edges of the firſt circle,
‘ the veſſels are more ſcattered and ſparſe,
‘ diſtinct trunks are eaſily ſeen, forming a
‘ circle of radiated arteries, which point to-
‘ wards the heads of the bone. Beyond that
‘ again, the cartilage is tranſparent and
‘ pure, as yet untouched with blood; the
‘ arteries have not yet reached it, and its
‘ oſſification is not begun. Thus, a long
‘ bone, while forming, ſeems to be divided
‘ into ſeven various coloured zones. The
‘ central point of moſt perfect oſſification
‘ is yellow and opaque; on either ſide of
‘ that there is a zone of red; on either ſide
‘ of that, again, the veſſels being more

‘ ſparſe, form a vaſcular zone; and the ‘ zone at either end, is tranſparent or white. ‘ The oſſification follows the veſſels, and ‘ buries and hides thoſe veſſels by which it ‘ is formed: the yellow and opaque part ‘ expands and ſpreads along the bone; ‘ the veſſels advance towards the heads of ‘ the bones; the whole body of the bone ‘ becomes opaque; and there is left only a ‘ a ſmall vaſcular circle at either end. The ‘ heads are ſeparated from the body of the ‘ bone by a thin cartilage; and the veſſels of ‘ the centre, extending ſtill towards the extremities of the bone, perforate that cartilage, paſs into the head of the bone, and ‘ then its oſſification alſo begins, and a ‘ ſmall nucleus of oſſification is formed in ‘ its centre. Thus the heads and the body ‘ are, at the firſt, diſtinct bones, formed ‘ apart, joined by a cartilage, and not ‘ united till the age of fifteen or twenty ‘ years.

‘ This proceſs, ſo difficult and ſlow, is ‘ aſſiſted by every proviſion of nature. The ‘ progreſs of the whole is ſlow, that ſo

‘ long as the body increaſes in ſtature, the ‘ bones alſo may grow: but it is aſſiſted ‘ in the individual parts, where ſome are ‘ ſlow, ſome rapid in their growth, ‘ ſome delayed, as the heads of joints, that ‘ their bones may be allowed to extend, ‘ and others haſtened, as the pelvis, that it ‘ may acquire perfect ſize in early life. ‘ Oſſification is aſſiſted by the ſoftneſs of ‘ the cartilaginous bed in which the bone ‘ is formed; by thoſe large and permeable ‘ veſſels which carry eaſily the groſſer parts ‘ of the blood; by a quick and powerful ‘ abſorption, which all along is modelling ‘ the bone; and, moſt of all, by being ‘ formed in detached points, multiplied ‘ and crowded together, wherever much ‘ bone is required.

‘ There is one central ring firſt oſſified ‘ in a long bone, as of the leg or arm; ‘ the heads or ends of the bone are, at firſt, ‘ mere cartilage, but they alſo ſoon begin ‘ to oſſify; the body ſtretches in a radiated form towards either head; the ‘ the heads oſſifying each in its centre alſo 'ſtretches towards the bone: the heads 'meet the body, and join to it; a thin car'tilage only is interpoſed, which grows 'gradually thinner, till the twentieth year, 'and then diſappears, the body, heads, 'and proceſſes, becoming one bone. In 'flat bones, as in the ſcull, oſſification goes 'from one or more central points, and the 'radiated fibres meet the radii of other 'oſſifying points, or meet the edges of the 'next bone. *The thick round bones, which* '*form the wriſt and foot, have each one oſſifica*'*tion in their centre, which is bounded by car*'*tilage all round.* The proceſſes are of'ten diſtinct oſſifications, joined to the 'bones, like their heads, and ſlowly con'ſolidated with them into firm bones.'

As the preceding long quotation from Mr. J. BELL's valuable work, includes every fact reſpecting the formation of bones, that is neceſſarily connected with the ſubject of the preſent enquiry, I truſt I ſhall be excuſed for having inſerted it, rather than attempt to relate the ſame facts in any other words.

As opportunities of examining ſubjects that have laboured under this deformity, do not occur ſo frequently as to enable us to demonſtrate the facts I have endeavoured to eſtabliſh, reſpecting the ſtate of the parts cocerned in this diſeaſe, I was obliged to aſſume it as a fact, that the bones were not, when conſidered ſeparately, deformed, before the patients had attained the age of two or three years; but the uniformity of my ſucceſs in curing it in children of that age, which was formed on that idea of the diſeaſe, and cannot be explained conſiſtently with any other, may now be ſaid to amount to poſitive proof, that no malformation of bones does take place before that period. My preſent attempt to aſcertain, under what circumſtances the diſeaſe is or is not curable, in patients after that time of life, muſt, in like manner, aſſume the form of conjectures, founded on obſerving what has paſſed, or is paſſing under my eye, in patients of greater age, and deductions from what we know of the animal economy in perſons of that age; and if fu-

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ture facts ſhould prove equally ſucceſsful, the doctrine will then be permanently eſtabliſhed by practice, to the greateſt extent to which it can be carried.

As the ſituation of a child now under my care will tend to elucidate this part of the ſubject, I ſhall briefly deſcribe the ſtate I found him in.

He was more than four years old when I firſt ſaw him; he was born with two feet, exactly reſembling Caſe IV. Page 15. As his parents were informed nothing could be done, nothing had been attempted to relieve him. He began to walk at the uſual time, and had walked ever ſince, wearing only common half-boots, with the notion of enabling him to walk rather better than he would do without aſſiſtance.

This caſe, according to notions generally received, was to be conſidered as abſolutely incurable, and perhaps incapable of alleviation. The bones were completely

oſſified:

oſſified *: at his age, and from the circumſtance of his having walked at leaſt two years upon them, there muſt have been conſiderable malformation of bones, and, therefore, according to all eſtabliſhed opinions, the diſeaſe was irremediable. As obſervations I had made in other caſes induced me to believe this patient might be much relieved, perhaps perfectly cured; as the conſideration of this caſe includes every circumſtance that can render the cure of any other caſe, after the age of two years, doubtful, or otherwiſe, I ſhall particularly explain the ſtate of his feet, and the reflections that occurred to me on examining them.

His toes pointed inwards, directly towards each other: when he ſtood, the os cuboides of each foot was on the ground, the feet ſeemed perfectly rigid, and there was no perceptible difference between them; but their

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* It will be more correct to ſay, they were no longer in the cartilaginous ſtate, but as completely oſſified, as the bones of children uſually are at that age.

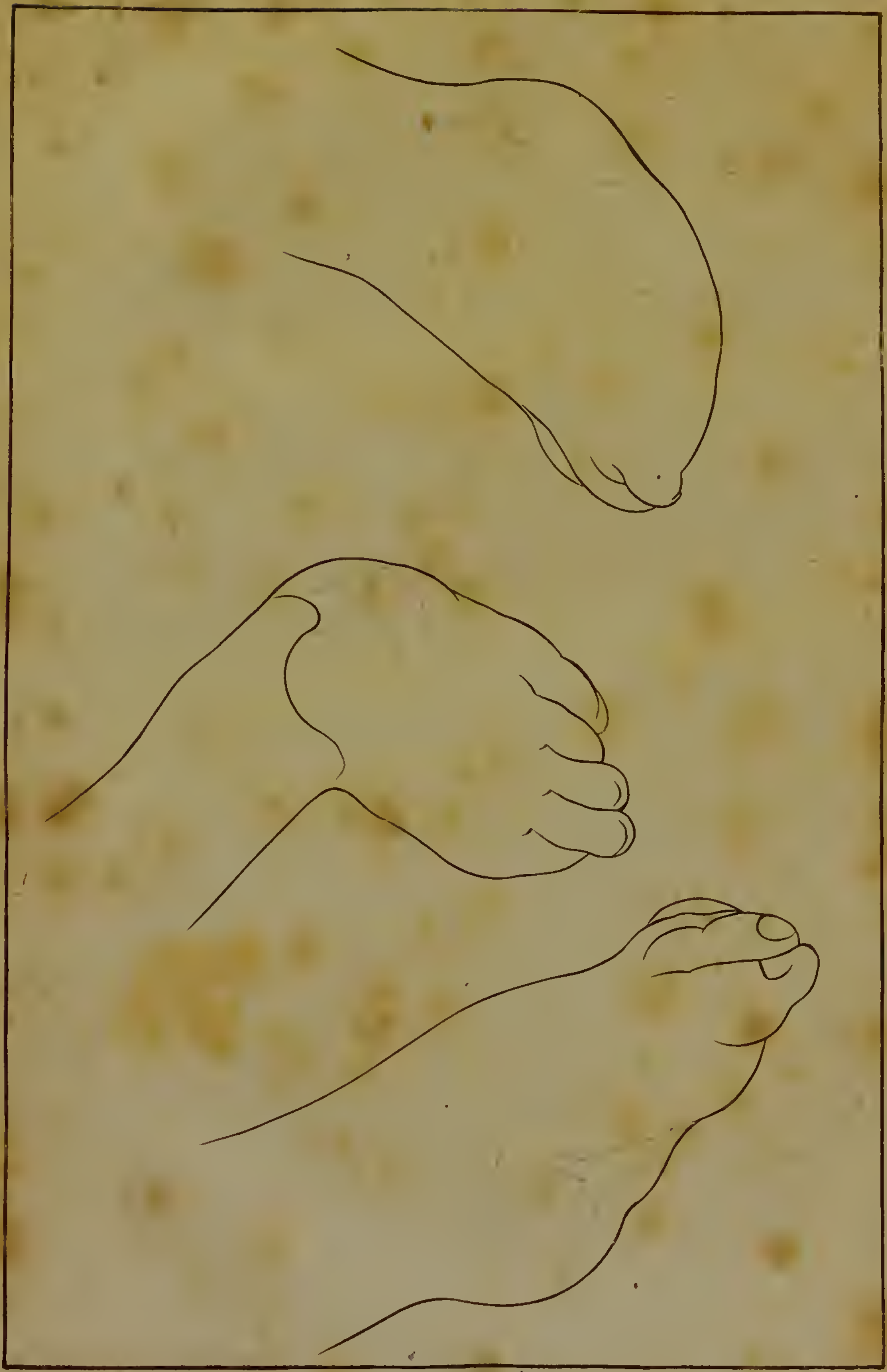
their condition will be better underſtood, by referring to the annexed figures, which I drew from the life.

*Pl.* X. contains three views of one of the feet, *viz.* the outſide, the inſide, and the top of the foot. The dotted lines indicate the poſition of the bones, as nearly as I could aſcertain their ſituation through the integuments: the black lines in the top view, indicate the poſition of the tibia and fibula.

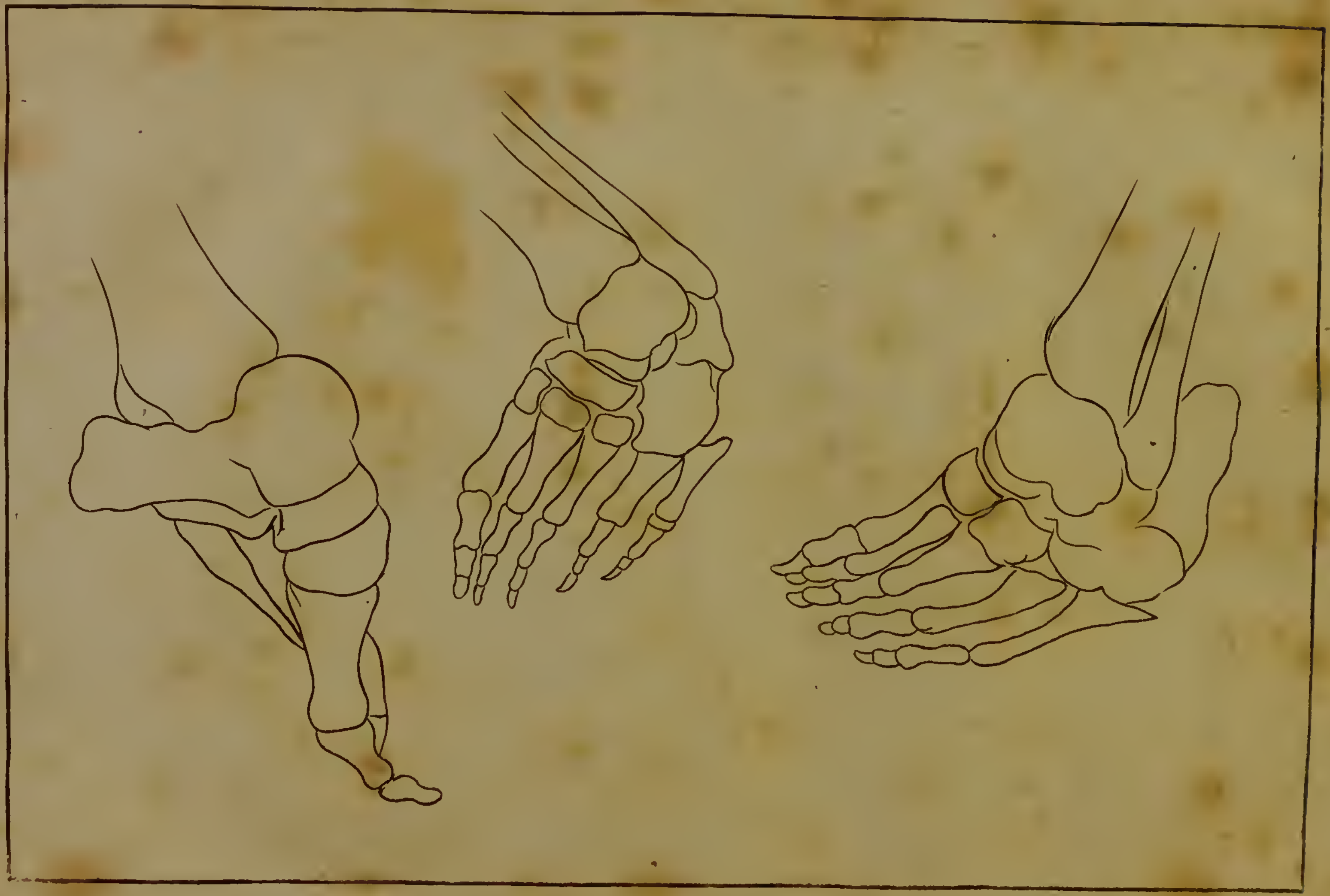
The poſition of the foot was ſuch, that the circular head of the aſtragalus, which ought to lie under the tibia, projected conſiderably forwards and outwards; therefore the os calcis, which ſhould have reſted on the ground when he ſtood, was moved cloſe to the tibia on the inſide of the leg, and gave the appearance of a very ſhort heel. The os cuboides was ſo much diſtorted from its natural ſituation, as to bring its upper ſurface on the ground, when he ſtood. That part of the aſtragalus which ſhould be joined to the os naviculare, ſeemed to project much; the os naviculare turning downwards, and inwards from it, at a very acute angle. The cuneiform bones made a ſimilar angle, with reſpect to the naviculare. The firſt phalanx of the metatarſus, formed a ſimilar angle, with reſpect to the cuneiform bones and cuboides; but all the other bones of the metatarſus were in their natural poſitions, with reſpect to the firſt phalanx.

The general aſpect of the caſe, when the child ſtood on his feet, was this; the aſtragalus ſo much out of its place, that its circular head preſented itſelf before the fibula, much of the os calcis laying under the ſcaphoid cavity of the tibia; the os cuboides ſo placed, as to bear the weight of the body when he ſtood; and the toes pointing directly towards each other, inſtead of ſtanding ſtrait forwards. Conſidering the foot ſuperficially, it was much broader and thicker than it ſhould be, with almoſt no heel. That it would finally and irrecoverably have acquired that form, there

Pl.10.



Pl. 11.



can be no doubt; but I truſt a ſhort time will ſhew, that it has not done ſo.

I then placed the dry bones of an adult foot, as nearly as poſſible, in the ſame ſituation. I drew three * views of theſe bones, (*Pl.* XI.) to correſpond with the preceding. By comparing theſe (*Pl.* X. and XI.) together, a more accurate idea of this child's feet, (allowing for what malformation had actually taken place) may be obtained, than can be conveyed by any other means.

Upon examining the bones in this ſituation, it muſt appear, that thoſe parts of them which form the under, and inſide of the foot, are cloſe together; but thoſe parts of the ſame bones which are on the upper, and outſide of the foot, have conſiderable ſpaces between them. This circumſtance deſerves particular attention, as it will ſerve to explain my ideas of the diſeaſe in its earlieſt ſtages, before any malformation of bones has taken place.

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* I do not pretend, by theſe ſketches, to repreſent correctly, the form of bones, but merely to indicate their relative poſition in the diſeaſed foot.

If the foot of an adult could, by luxation, or other means, be placed in a ſimilar poſition, the bones of that foot would be in the ſame ſituation, with reſpect to each other, as thoſe I have drawn. If the foot of the fœtus in utero is, by compreſſion, or whatever other means it is occaſioned, placed in a ſimilar poſition, the bones, or rather the cartilages which are afterwards to become bones, are in the ſame relative ſituation. It is from this ſtate of the parts only, that the uniform ſucceſs with which I have reduced theſe feet to their natural ſtate, in a ſhort time, can be accounted for; for the time, in ſome caſes ſo little as twenty days, does not allow us to believe any alteration in the form of individual bones can have taken place. But if it ſhall be ſuppoſed, that in this ſtage of the complaint, there is any malformation of bone, then the advantage of undertaking the cure as early as poſſible, muſt be admitted, upon the commonly received notion, that the ſoftneſs of the bones renders that ſtage of the complaint peculiarly favorable for compreſſing them into their natural form.

When a child, born with ſuch feet, has remained twelve, or perhaps eighteen months, without any attempt being made to reduce them, a material alteration has taken place in the condition of the bones. A conſiderable part of the round bones, and perhaps the head of the tibia, are oſſified; and as in the growth of the patient, the increaſe of cartilage precedes the formation of bone in thoſe parts, the cartilaginous part (if I may be allowed the expreſſion) of the bones concerned in the diſeaſe, begins to aſſume an unnatural form; becauſe they will grow, for want of the natural compreſſion, till the ſpaces between the ſuperior parts of the bones of the tarſus is filled up, by the proportionable growth of each bone, till they meet. In this ſtage, the progreſs of the cure is more tedious, becauſe one part of it conſiſts in preventing the farther growth of thoſe ſuperabundant parts, and even diminiſhing that malformation which has already taken place, by compreſſing the foot into a proper ſituation : ſtill, allowing for the additional trouble occaſioned by the advanced age of the patient, the cure has always been complete.

But in the laſt ſtage, when all the bones are completely oſſified, that is, when the whole ſubſtance of them is really become bone, though ſofter than the bones of an adult, and covered with cartilage in every direction, to provide a bed for its future increaſe, when the patient has walked, and thus perhaps increaſed the original deformity and diſtortion, we are no longer juſtified in ſaying all ſuch caſes may be cured. The doctrine I hope to maintain is, that many of them may ſtill be cured, provided no inſurmountable obſtacle is oppoſed by the accidents of any given caſe: and as both the doctrine and the nature of the accidents that may arrive will be illuſtrated by the caſe I have already mentioned, I ſhall proceed with my examination of it.

The moſt ſtriking peculiarity of this caſe, and the circumſtance of moſt importance in this, and all ſimilar caſes, is, the poſition of the aſtragalus; its circular head projecting forwards, almoſt removed from under the tibia, and the end of that bone occupying much of the ſpace between the head of the aſtragalus and the os calcis.

The ſcaphoid cavity of the tibia was certainly intended to receive the head of the aſtragalus; and all the motion of the body over the foot, depends more upon the natural form and juxta poſition of thoſe parts being preſerved or reſtored, than upon any other circumſtance. In the formation of the fœtus there is, no doubt, a natural arrangement of parts, tending to facilitate its growth and progreſs towards its final form, if I may be permitted to uſe the expreſſion: there is a diſpoſition to grow progreſſively into that form; but the final accompliſhment of that purpoſe depends upon the natural action of all the parts being preſerved or reſtored, and afterwards kept up, during the whole progreſſive growth of the animal, till it arrives at maturity.

turity. In the parts we are now conſidering, the continual friction of the ſcaphoid cavity over and upon the head of the aſtragalus, from the time the child firſt moves its foot, till it arrives at maturity, certainly preſerves and maintains their natural form; and by this means, their capacity for their natural action. By the derangement of thoſe parts in this diſeaſe, the natural action is immediately impeded, and, for the time, in many caſes, deſtroyed. If the derangement continues, the parts, for want of mutual friction, begin to aſſume a new and unnatural form. The ſcaphoid cavity may be ſo far obliterated, as not to receive the head of the aſtragalus, if *that* could be reduced into its ſituation; or the head of the aſtragalus might aſſume ſuch a form, as would for ever prevent it from being replaced in the ſcaphoid cavity, if *that* were capable of receiving it. In either caſe, the deformity muſt be irremediable; for, however perfectly the other parts of the foot might be reſtored to their natural form, the defect remaining in this grand centre, over which the body is moved, muſt ever prevent *them* from moving in the natural way ; on the contrary, however imperfect the reſt of the foot may remain, if the natural, relative poſition of the tibia and aſtragalus can be reſtored, the patient may be enabled to walk with tolerable eaſe and activity. After the age of two or three years, the poſſibility of effecting this muſt vary, according to circumſtances. In the preſent inſtance, I thought it practicable ; and therefore have ventured to ſay, he will at leaſt be ſo far cured, as to have his feet rendered ſerviceable.

In examining the other bones of the foot, in this caſe, I found the os naviculare bending inwards, and forming an acute angle, in this direction, with reſpect to the aſtragalus ; and that part of the aſtragalus which ſhould join to the naviculare, when in the natural ſtate, in this caſe ſeemed to form an unnatural projection on the top of the foot. I ſay *ſeemed* to form, becauſe, though in this caſe there was, from the age of the patient, ſome enlargement of the bone, in younger chidren, children, this enlargement of the upper part of the foot is a deception, occaſioned by the improper poſition of theſe bones of the tarſus; but, in patients farther advanced in life, it becomes a malformation of thoſe bones, that is ſometimes abſolutely incurable.

The cuneiform bones, and the os cuboides, are under the ſame circumſtances as the aſtragalus; that is to ſay, they have, at firſt, from their poſition, only the appearance of being enlarged on the top of the foot; but, in time, that enlargement becomes real, permanent, and at laſt, perhaps, irremediable.

If thoſe ſketches of the dry bones, which I have made to repreſent the upper and outſide of the foot, be examined, it will be ſeen that there are ſpaces between the ſurfaces of the bones, when viewed in thoſe ſituations; but if the underſide is examined, they will be found cloſe together. In early infancy, the bones of feet diſtorted in this manner, are in this ſituation, ſo far as relates to form and poſition. Each individual bone, or, to ſpeak with more propriety, each cartilage that is afterwards to become bone, has its perfect and natural form; but by whatever cauſe the diſeaſe is produced, they are placed in poſitions ſimilar to thoſe repreſented in my ſketches: whence it happens, that when thoſe obſtacles which ariſe from the condition of the muſcles and ligaments are overcome, the bones are immediately placed in their natural poſition: but when that period arrives, which I have deſcribed by ſaying the oſſification is complete, each bone of the tarſus has acquired an unnatural form, becauſe, the ſpaces that were between the upper parts, are filled up by ſuperabundant oſſification of the ſuperior parts of each bone. At this period of the diſeaſe, it has been univerſally believed to be impoſſible to cure it; but as many facts, within my own experience, have induced me to form a different opinion, I ſhall be excuſed for taking this opportunity of inveſtigating the ſubject a little farther.

While the old, erroneous opinions, that bone was an almoſt unorganiſed concrete, was formed by layers from the perioſteum, &c. &c. prevailed, it is by no means ſurpriſing that another erroneous opinion ſhould be engrafted upon them, *viz.* that bone once formed, could never have its form altered. This, in ſome particular inſtances, may be true; becauſe the means of producing alterations in the form of ſome bones are not known, or becauſe they cannot be applied; but not from any phyſical impoſſibility that can be deduced from the nature of bones. If this can be made evident, if it can be ſhewn, that in the diſeaſe at preſent under conſideration, the means of producing alterations in the unnatural form of the bones of the foot can be applied, all ideas of the impoſſibility of curing many caſes of this diſeaſe that have been thought incurable, muſt vaniſh.

Mr. JOHN BELL has demonſtrated, that ‘ Oſſification is a proceſs of a truly animal ‘ nature. No coagulation will harden car‘ tilage into bone; no change of conſiſt-

‘ ence will form the blood into it; no condenſation of the perioſteum can aſſimilate ‘ it to the nature of a bone. Bone is not ‘ the inorganic concrete, which it was once ‘ ſuppoſed, but is a regularly organiſed ‘ part, whoſe form ſubſiſts from the firſt, ‘ which is perfected by its ſecreting arteries, balanced, as in every ſecretion, by ‘ the abſorbents of the part.’ *Page* 19. Again. ‘ Thus every bone has, like the ‘ ſoft parts, its arteries, veins, and abſorbent veſſels. *Page* 17.

‘ Yet, by theſe experiments with madder, one moſt important fact is proved to ‘ us; that the arteries and abſorbents, acting in concert, alternately depoſite and reabſorb the earthy particles, as faſt as can ‘ be conceived, of the ſoft parts, or even ‘ of the moſt moveable and fluctuating humours of the body. The abſorption of ‘ the hardeſt bones is proved by daily obſervation, &c.’ *Page* 16.

He has proved too, that the progreſs of oſſification of the round bones of the foot, which I am at preſent conſidering, is from the centre of each bone diverging outwards, in the following order, reckoning from the outſide towards the centre, firſt, a tranſparent, tremulous jelly; then cartilage, in which blood veſſels are afterwards ſeen, and by which the earthy particles are finally depoſited, to give the bones ſtrength. Thus it appears, they are always hardeſt, and moſt perfectly formed in the centre, and leaſt ſo in the external parts, where they touch, or ought to touch each other.

There is, no doubt, a natural arrangement of parts, tending to facilitate the growth and progreſs of the bones towards their final form. There is, likewiſe, a diſpoſition to grow in any direction, that may be requiſite, to ſupply any defect in the form that may be occaſioned by accident: thus, when the bones of the foot have been ſeparated in the manner I have deſcribed, and are kept aſunder till the child has arrived at the age of three or four years, the ſpaces between them are filled up by the unnatural growth of each bone.

As it will hardly be aſſerted, that we cannot, by bandage adapted with moderate ſkill, and applied with competent attention, confine a deformed foot in any requiſite ſituation; and by inſtruments properly adapted to ſupply its defects, ſo far as to enable the patient to walk with a degree of activity, proportioned to the circumſtances of the caſe; I ſhall proceed to conſider the effects of preſſure, when applied, with a view to reduce the deformity of a foot, in which a conſiderable degree of malformation of bones of the tarſus has taken place.

If ſo much preſſure is applied as to bring the ſeparated parts of thoſe bones into contact, and is invariably ſupported, it will ſtop the growth of that gelatinous ſubſtance, which is firſt formed in thoſe parts where the bones come in contact with each other; in thoſe parts which do not come into contact, it will continue to grow till they meet; the progreſs of oſſification will be continued, in the natural way, till the patient arrives at maturity; and with no more malformation than exiſted at the time the preſſure was firſt applied.

If more preſſure is applied, and uniformly kept up, the cartilages will be compreſſed in thoſe parts in which they come in contact; and if only the natural action of the foot is permitted, will aſſume a permanent form, as nearly approaching to the natural one, as the pre-exiſting deformity will admit. This compreſſion of the cartilages will, by condenſing their ſubſtance, prevent the arteries from ſhooting ſo freely into it, in an improper direction, as they would have done but for this impediment, and thus ſtop the progreſs of oſſification in an improper direction, while that proceſs will go on in the natural way, in every other part, till the patient has arrived at maturity, and every part is completely formed.

If the ſame preſſure is uniformly continued, or a greater degree of preſſure be conſtantly applied, the action of the arteries, which depoſite the earthy particles neareſt the ſurface of the bones, will likewiſe be impeded, while the action of the abſorbents, which, in the courſe of circulation, are employed in taking up earthy particles, will be continued in full vigour, if it is not increaſed; and by perſeverance in this proceſs it is certainly poſſible, that an unequal action, *i. e.* a diminiſhed action of the ſecreting veſſels, and an increaſed action of the abſorbing veſſels, may be kept up, and ſo modified, as to alter the form of theſe bones, long after they are oſſified; and, of courſe, ſo much of the deformity of ſuch feet as depends on malformation of the bones, may be radically cured, long after that period of life at which they have generally been thought incurable.

Having ſaid thus much on the bones of the tarſus, their junction with each other, and with the bones of the leg, and the derangement of thoſe junctions, which take place in the diſeaſe in queſtion, it only remains to conſider the metatarſal bones in the ſame points of view, to complete this part of the ſubject.

As the bones of the metatarſus are, in ſome reſpects, ſimilar to the cylindrical bones of the leg and arm, the general progreſs of their formation is the ſame, *i. e.* the centre is firſt oſſified, and oſſification proceeds gradually from thence to each end. There is no reaſon to ſuppoſe the bodies of the metatarſal bones are deformed in this diſeaſe, though the heads which unite them to the tarſus, and to each other, certainly are diſtorted, in ſome caſes. When they are ſo, it is from the ſame cauſes, and in a ſimilar manner to the diſtortion of the tarſal bones. They are liable to the ſame alterations, both in their diſeaſed ſtate, and their progreſs towards a cure: and as theſe circumſtances have been fully explained, in ſpeaking of the bones of the tarſus, it will be needleſs to repeat what has been ſaid of them here.

I have thus endeavoured to prove, that before the age of two years the individual bones of a club-foot are not diſtorted in any manner; that as far as the bones are concerned in the diſeaſe, it is only by improper combination; that after the age of two years, individual bones become deformed, according to circumſtances which vary in different caſes; but which do not, in all, render the diſeaſe incurable. I ſhall now proceed to examine the condition of the ligaments, in various ſtages of the diſeaſe, in order to diſcover what alterations muſt be produced in them, in order to effect a cure.

## Of the LIGAMENTS and MUSCLES.

As thoſe who are acquainted with the number and variety of the ligaments which connect the bones of the foot with each other, and with the leg, will agree that it is needleſs to enter into a minute deſcription of them all, on this occaſion; and as thoſe who are not acquainted with them would not comprehend that deſcription, I ſhall confine myſelf to ſuch general obſervations on their nature and properties, as will explain the changes they muſt undergo, in the progreſs of a club-foot, from the diſeaſed to the perfectly natural ſtate; prefixing, however, ſuch deſcriptions of them as are requſite, in the words of the author I have already quoted.

'The * perioſteum which has run 'along one bone, leaves it at the head, and 'forming a bag for the joint, goes onwards 'to the next bone. Thus the perioſteum 'of all the bones is one continued membrane, paſſing from point to point; each 'bone is tied to the next by its own perioſteum, and this membrane betwixt the 'end of one bone, and the beginning of 'the next, is ſo thickened into a ſtrong 'and hard bag, as to form the capſule of 'the joint; and the perioſteum is aſſiſted 'in performing this office, by the tendons; 'faſcia,

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* Anatomy of the Bones, &c. by J. BELL, page 409.

‘ faſcia, burſæ, and all that confuſion of ‘ cellular ſubſtance which ſurrounds the ‘ joint. The *capſule* of the *joint* is then a ‘ firm and thick bag, which, like a ligament, binds the bones together, keeps ‘ their heads and proceſſes in their right ‘ places, contains the glairy liquor, with ‘ which the heads of moving bones are bedewed, and prevents the adjacent parts ‘ falling inwards, or being catched betwixt ‘ the bones, in the bendings of the joints. ‘ The capſule of every joint proceeds from ‘ the perioſteum, and is ſtrengthened by ‘ the tendons ; it is formed like theſe parts, ‘ out of the cellular membrane ; and when ‘ a bone is broken, or its perioſteum deſtroyed by any accident or diſeaſe, when ‘ a tendon ſnaps acroſs, when a joint is ‘ luxated, and the capſule torn, the injury ‘ is ſoon repaired by a thickening of the ‘ cellular ſubſtance round the breach ; and ‘ wherever a bone, being luxated, is left ‘ unreduced, a new ſocket, new perioſteum, ‘ new ligaments, and new burſæ, are ‘ formed out of the common cellular ſubſtance ; and though the tendons may

‘ have been torn away from the head of ‘ the bone, they are fixed again, taking a ‘ new hold upon the bone.

‘ A joint* is compoſed of the heads of ‘ the bones ſwelling out into a broader ‘ articulating ſurface, and of a thin plate ‘ of cartilage, which covers and defends ‘ the head of each bone; ſometimes of ‘ ſmall and moveable cartilages, which roll ‘ upon the bones, and follow all the motions of the joint, and, like friction ‘ wheels in machines of human invention, ‘ abate the bad effects of motion. There ‘ are mucous glands, or rather mucous ‘ bags, which convey a lubricating fluid: ‘ and there is a burſal ligament, which ‘ forms the purſe of the joint, bends the ‘ bones together, contains the ſynovia, and ‘ prevents the ſurrounding parts from being catched in the joint. There are leſſer ‘ ligaments on the outſide of this, going ‘ along the ſides of the joint, and paſſing

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* Anatomy of the Bones, &c. by J. Bell, page 414.

‘ from point to point; there are great ‘ tendons moving over the joint, and burſæ ‘ or mucous bags, which accompany theſe ‘ tendons, and prevent the violence which ‘ their continual rubbing might do to the ‘ bones.’

Speaking of the ancle joint, he ſays, ‘ The ancle joint* owes leſs of its ſtrength ‘ to ligaments, than to the particular forms ‘ of its bones; for while the ſtrong lateral ‘ ligaments of the knee guard it, ſo that it ‘ cannot be diſlocated till they are torn, the ‘ lower heads of the tibia and fibula ſo ‘ guard the foot, that it cannot be luxated ‘ ſideways, without ſuch violence as breaks ‘ thoſe bones. Firſt, the fibula is ſo connected with the tibia, at the lower end, ‘ that they form together one cavity for ‘ receiving the aſtragalus, with two projecting points, the fibula forming the ‘ outer ancle, and the tibia forming the ‘ proceſs of the inner ancle. The joining

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* Anatomy of the Bones, &c. by J. Bell, page 452.

‘ of the fibula to the tibia here, is like that ‘ of its upper end, too cloſe to admit of ‘ the ſmalleſt motion, and it is thoroughly ‘ ſecured by particular ligaments, one of ‘ which paſſing from the fibula to the tibia, ‘ on the fore part, is named the *ligamentum* ‘ *ſuperior anticum*, conſiſting, in general, of ‘ one or two diſtinct flat bands. Another ‘ more continued and broader ligamentous ‘ membrane, goes from the fibula to the ‘ tibia, acroſs the back part, and is named ‘ *ligamentum poſticum ſuperius*; the *ligamentum* ‘ *poſticum inferius* being but a ſlip of ‘ the ſame. Next comes the capſule of the ‘ joint, which joins the aſtragalus to the ‘ lower heads of the tibia and fibula. It is ‘ thinner, both before and behind, than ‘ we ſhould expect, from the ſtrength of ‘ a joint, which bears all the weight, and ‘ the moſt violent motions of the body; ‘ but, in fact, the capſule every where ‘ ſerves other purpoſes than giving ſtrength ‘ to the joint, and never is ſtrong, except ‘ by additional ligaments from without. So ‘ it is with the ancle joint, the capſule of ‘ which is exceedingly thin before; but it

‘ is ſtrengthened at the back part, and ‘ eſpecially at the ſides, by ſupplementary ‘ ligaments. Firſt, a ſtrong ligament comes ‘ down from the acute point of the inner ‘ ancle, expands in a radicated form upon ‘ the general capſule, adheres to it and ‘ ſtrengthens it, and is fixed all along the ‘ ſides of the aſtragalus. This ligament, ‘ coming from one point, and expanding ‘ to be inſerted into a long line, has a triangular form, whence it is named *ligamentum deltoides* ; and while the general ligament ſecures the joint towards that ſide, ‘ the oblique fibres of its fore edge prevent ‘ the foot being too much extended, as in ‘ leaping, and its oblique fibres on the ‘ back edge prevent its being too much ‘ bended, as in climbing ; but the ligaments of the outer ancle, tying it to the ‘ outer ſide of the aſtragalus, are indeed ‘ diſtinct, one going forwards, one going ‘ backwards, and one running directly ‘ downwards : one goes from the point or ‘ knob of the fibula, obliquely downwards ‘ and forwards, to be inſerted in the ſide ‘ of the aſtragalus : it is ſquare and flat,

‘ of conſiderable breadth and ſtrength; and ‘ is called *ligamentum fibulæ anterius*: another ligament goes perpendicularly downwards, from the acute point of the outward ancle, to ſpread upon the ſide of the aſtragalus, and of the capſule, and is finally inſerted into the heel bone; this is ‘ named the *ligamentum fibulæ perpendiculare*: ‘ a third ligament goes out ſtill from the ‘ ſame point, to go backwards over the ‘ back part of the capſule, adheres to the ‘ back of the capſule, and ſtrengthens it, ‘ and is named *ligamentum inter fibulam et aſtragalum poſterius*.’

Again, deſcribing the joints of the foot, he ſays, ‘ The *os aſtragalus, os calcis, os ‘ naviculare, and all the bones of the tarſus, are united to each other by large ‘ heads, and diſtinct and peculiar joints; ‘ beſides which, the bones are croſs tied to ‘ one another by ligaments, ſo numerous ‘ and complicated, that they cannot, nor

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* Anatomy of the Bones, &c. by J. Bell, page 455.

‘ need not be explained. They paſs acroſs ‘ from bone to bone, in an infinite variety ‘ of directions, ſome longitudinal, ſome ‘ tranſverſe, and ſome oblique. There is ‘ a curious complication, which we may ‘ call a web of ligaments, covering either ‘ ſide of the foot with ſhining and ſtar-like ‘ bundles. Each bone has its capſular ligaments, for joining it to the next; each ‘ joint of each bone has its articulating ‘ cartilages, always freſh and lubricated; ‘ each joint has, beſides, its capſular flat ‘ ſtripes of oblique, longitudinal, and tranſverſe ligaments, joining it to the neareſt ‘ bones; and the greater bones have larger ‘ and more important ligaments, as from ‘ the aſtragalus to the os calcis, from the ‘ os calcis to the os naviculare, and from ‘ that to the ſcaphoid bone, &c. &c.

‘ The metatarſal bones have their capſular ligaments, joining them to the tarſal ‘ bones, and they have ligaments ſtrengthening their capſules, and tying them ‘ more ſtrongly to the tarſal bones; and, ‘ as in the metacarpal bones, the ſeveral

‘ ranks are tied one to another by croſs ‘ ligaments, which paſs from the root of ‘ one bone to the root of the next. We ‘ have ligaments of the ſame deſcription ‘ and uſe, holding the metatarſal bones ‘ together, both on the upper and on the ‘ lower ſurface of the foot; and all the ligaments of the foot are of great ſtrength ‘ and thickneſs. The lower ends of the ‘ metatarſal bones have alſo tranſverſe ligaments, by which they are tied to each ‘ other. The toes have hinge-joints, formed ‘ by capſules, and ſecured by lateral ligaments, as thoſe of the fingers are; and, ‘ except in the ſtrength and number of ‘ ligaments, the joinings of the carpus, ‘ metacarpus, and fingers, exactly reſemble ‘ the joinings of the tarſus, metatarſus, ‘ and toes.

‘ But theſe ligaments, though helping ‘ to join the individual bones, could not ‘ have much effect in ſupporting the whole ‘ arch of the foot. It is further ſecured ‘ by a great ligament, which extends in one ‘ triangular and flat plate, from the point

‘ of the heel to the roots of each toe.
‘ This is named the *aponeuroſis plantaris pedis*, which is not merely an aponeuroſis
‘ for covering, defending, and ſupporting
‘ the muſcles of the foot; that might have
‘ been done on eaſier terms, with a faſcia,
‘ very ſlight compared with this; but the
‘ chief uſe of the plantar aponeuroſis is in
‘ ſupporting the arch of the foot. It paſſes
‘ from point to point, like the bow-ſtring
‘ betwixt the two horns of a bow, and
‘ after leaping, or hard walking, it is in
‘ the ſole of the foot we feel the hard
‘ ſtraining and pain; ſo that, like the palmar aponeuroſis, it ſupports the arch,
‘ gives origin to the ſhort muſcles of the
‘ toes, braces them in their action, and
‘ makes bridges, under which the long tendons are allowed to paſs; it comes off
‘ from the heel in one point; it grows
‘ broader, in the ſame proportion as the
‘ ſole of the foot grows broad. It is divided into three narrow heads, which
‘ make forks, and are inſerted into the
‘ roots of the ſecond, third, and fourth
‘ toes; and the great toe and the little toe

‘ have two ſmaller or lateral aponeuroſis, ‘ which cover their own particular muſ- ‘ cles, and are implanted into the roots of ‘ the great toe and little toe.’

From theſe demonſtrations of the ligaments of the joints of the ancle, the tarſus, and the metatarſus, which I have extracted from Mr. Bell’s valuable work, and from what has been ſaid of the condition of the bones in various ſtages of club-foot, the condition of the ligaments, in different ſtages of this diſeaſe, may be well underſtood. Upon referring to the ſituation of the bones of the foot, as I have already ſketched them, it will be ſeen, that the bones are, on the upper and outſide of the foot, at ſome diſtance from each other; and if nothing is done to alter that poſition, will continue ſo, till the period of life at which the improper growth of each bone has filled up the interſtices between them. On the under, and inſide of the foot, the bones are always as cloſe together as in the natural ſtate. Now as the capſular ligaments are formed by a continuation of the

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perioſteum, paſſing from one bone to the next, as the bones of the foot are originally gradually placed, ſo as to grow into this form, the capſular ligaments muſt derive a peculiarity of form from the accidental poſition of the limb. As the bones of the tarſus have no perceptible motion on each other, the capſules which connect them, unite them cloſely together, and keep them firmly ſo, when in their natural ſtate; and in this diſeaſe, the capſules on the under ſide of the foot, are in the ſame condition, *i. e.* they unite the bones of the foot firmly and cloſely together; but on the upper ſide of the foot, as they paſs from one bone to the next, their extraordinary length muſt be exactly equal to the unnatural diſtance between thoſe bones. If, therefore, we conſider this part of a foot, ſo diſeaſed, and ſuppoſe it diveſted of every obſtacle, from the ſtate of the muſcles, that would prevent us from placing it in the natural ſtate, it would only be requiſite to preſs the upper parts of the tarſal bones together; and as there is not, nor can be much, if any contraction in the capſule on the underder-ſide of the foot, there would be no obſtacle in preventing them from being immediately placed in their natural poſition. But as the ancle joint is intended to move freely backwards and forward, its capſule muſt be in the natural ſtate, ſo formed, as to admit of this motion. In the diſeaſed ſtate, however, the caſe is very different; there has never been the natural motion in the parts: the capſule is, therefore, like the capſules of the tarſal bones, a mere continuation of the perioſtium, uniting them as firmly together, as their poſition will allow. Now if the other obſtacles which prevent the reduction of the ancle joint to its natural poſition were removed, we could not, as in the tarſal bones, immediately place the bones concerned in the ancle joint in their natural ſituation; becauſe there is a permanent contraction of the capſular ligament on the back of the joint, and the reduction of the bones of the ancle joint, into their natural ſituation, can never be effected, ſo long as that contraction continues. Here then, a new operation becomes neceſſary, *i. e.* by mechanical means, to produce ſuch an alteration in the ſtate of this capſule, as ſhall allow of the natural quantity of motion. The metatarſal bones have more motion than the bones of the tarſus, and leſs than the ancle joint, and therefore in the point of view I am now conſidering them, hold a middle ſituation between the two: but as the foot is always contracted, ſo as to draw the toes more or leſs downwards, and inwards, in this diſeaſe, there muſt always be a permanent contraction of the plantar aponeuroſis, exactly proportioned to the degree in the deformity. The other ligaments, which, as they partake of the ſame general nature, and contribute with the capſular ligaments to preſerve the bones in their poſitions, are to be conſidered all together in the ſame point of view, with reſpect to their contraction, or other deviations from the natural ſtate.

It is this contraction of the ligaments, which conſtitute the eſſential part of the diſeaſe, before the age of two or three years, when the bones begin to be affected, and afterwards become the moſt important part of the deformity; for though there is, likewiſe, muſcular contraction, yet as the muſcular fibre is more eaſily acted upon than the ligament, from its peculiar nature, can be, this muſt always claim the greateſt part of our attention, ſince it is certain, that whatever means are ſucceſsfully uſed to produce the requiſite alterations in the ligaments, muſt neceſſarily produce, in leſs than the ſame time, the requiſite alterations in the ſtate of the muſcles; but the reverſe of this poſition can never, in the nature of things, be true.

The ligaments are powerfully elaſtic, but endued with very little active ſenſibility, by which qualities they are peculiarly adapted to their functions of binding the bones firmly together, when they ſhould be ſo bound; of limitting their motion, when bounds ought to be ſet to it; and of reſiſting the effects of ſtrains of every deſcription, from all the violent actions to which the parts may ſafely be rendered liable. But if forced beyond this, a material alteration takes place in all their ſenſible properties. If a limb is ſtrained by any action, too violent for the parts to bear, and the ligaments are not lacerated, they are forcibly extended in length, inflammation comes on, ſenſibility is excited to a degree, of which very few other parts are ſuſceptible, and, too frequently, the moſt dreadful conſequences enſue. If theſe are averted, and the ſenſibility and inflammation removed, the parts are, for want of ſenſibility, and from other properties, peculiarly ſlow in recovering their natural tone and full power of performing their natural functions. In a young growing animal they *may* perfectly recover it, but in an adult, or old one, almoſt never; as is too well known to thoſe who have opportunities of obſerving the conſequences of ſprains, often apparently ſlight, and too ſorely experienced by thoſe to whom ſuch accidents happen.

Now as the eſſential operation to be performed, in curing a club-foot, is to produce ſuch an extention of ſome of the ligaments, as, if it happened by accident, would conſtitute a conſiderable ſprain, it certainly is the duty of the operator, ſo to conduct this operation, that none of the conſequences which would have taken place from an accidental ſprain, ſhall enſue. If he does not do this, he will certainly leave his patient in a worſe condition than he found him; for a child had, no doubt, better be lame from deformed feet only, than from the ſame deformity combined with debility, ariſing from luxation, or ſprains from injudicious treatment. This circumſtance has always been ſo ſtrongly impreſſed on my mind, that after the matureſt conſideration, and reiterated experience, I feel myſelf juſtified in laying it down, as a rule moſt proper to be followed, to employ ſomething more time than may be abſolutely neceſſary to effect the reduction; rather than riſk the conſequences of a more precipitate proceeding. I have, indeed, when called to a patient in the country, or at a diſtance from home, when the time of my attendance was neceſſarily limited, proceeded in the neceſſary operations with all poſſible diſpatch; but always with a degree of anxxiety I would not willingly encounter, and a riſk to the patient, which nothing but neceſſity can juſtify us in hazarding. I have, indeed, never ſeen any accident happen, in my own practice, from precipitate treatment; but ſhall be excuſed for relating the following caſe, to ſhew the conſequences of raſhneſs and ignorance united.

A Gentleman had a ſon born with two club-feet. He had been told I had diſcovered a method of curing this diſeaſe, and had a patent for the invention; and for this reaſon, he intended to put the child under my care. But he accidentally met with a youth, whoſe ignorance can only be equalled by his diſhoneſty, who aſſumed my name and character, declared himſelf the inventor and patentee, and undertook to cure the child. He might have examined my ſpecification in the office, as it was not then publiſhed; he might have ſuborned ſome of my ſervants to give him ſome information of the inſtruments I uſe; for he certainly did make ſuch imitations of them, as would have ſubjected him to a proſecution, had I choſen to put the laws in force againſt him. For a very ſhort time he exulted in his ſucceſs, for the child was ſaid to get better; but, in a few days, there was a general inflammation of both legs, and he was obliged to deſiſt. Unfortunately for the patient, this inflammation ſubſided in a few days; I ſay *unfortunately*, ſince it induced the parents to ſubject the child again to this treatment, when freſh inflammation was produced, to a more dangerous extent, and more permanent in its effects; for notwithſtanding a conſiderable time has elapſed ſince this emperic was diſcarded, the child remains in the ſame condition; the feet deformed, as at firſt, and apparently weak and uſeleſs, from the ſevere treatment they experienced.

There can be no doubt, but that by aſſuming my name and character, and calling himſelf the inventor of the method of curing the diſeaſe, his intention was to defraud me of the reputation, and what little profit could be obtained from the caſe. The cautions that were given him to deſiſt, perhaps,

haps, only ſtimulated him to perſeverance, and induced him to exert himſelf to ſupport his impoſture, and ſhew how much he could do; but as he is in the moſt perfect ignorance of every part concerned in the diſeaſe, it is not ſurprizing, ſuch an undertaking ſhould terminate in his diſgrace; though it is difficult to conceive what apology he can make to a Gentleman, for having ſo treated his child. The event of this caſe may ſerve as a neceſſary caution to the unwary, to aſcertain, correctly, who they confide in, upon an occaſion of ſuch importance.

After ſo much extenſion of the contracted ligaments has been produced, as will enable us to place the foot in its natural form, a further alteration in the condition of thoſe ligaments muſt take place, before the cure is complete. The ligaments that have been extended remain weak, and, in that reſpect, ſimilar to thoſe that have been violently ſtrained, and the inflammation of which has recently ſubſided. By bringing the upper parts of the tarſal, and metatarſal bones into contact, the ligaments which connect them are too long and looſe for their ſituation and office; whence the whole foot, inſtead of being firmly bound together by the ligaments, as in the natural foot, is looſe, and may be thrown into many improper poſitions, by various actions or accidents, and, by this means, occaſion a relapſe into the former deformity, or give riſe to a new one. To prevent this, it will always be neceſſary to keep the foot bound, by proper inſtruments and bandages, in its natural poſition, till the parts have ſo far recovered their natural powers, as to render this alteration improbable; the patient may then be ſafely ſuffered to go without any.

The time requiſite to effect this, will vary in patients of the ſame age, but differently circumſtanced with reſpect to the diſeaſe; and it will vary materially, in proportion to the age of the patient. In general, I have found, that in children taken at, or within two months of the birth, a cure will be, in every ſenſe, complete, by the time they begin to walk. If not began till two years old, it will be at leaſt as long before a child can go without ſupport: and thus the time requiſite to effect a cure will increaſe, progreſſively, with the age of the patient, till they have completely done growing, at which period it is poſſible that ſome patients may be ſo far cured, as to have their feet reduced into the natural form; but it is unlikely, that they ſhould, even then, ever be able to walk without artificial ſupport.

The cauſe of this difference of time requiſite to effect a cure, in patients of different ages, is the peculiar nature of the ligaments, which are leſs ſuſceptible of alteration than any of the other ſoft parts of the body. The muſcles are, from their texture, eaſily affected by various diſeaſes: they are ſtrengthened and enlarged by action, they are waſted and debilitated by diſeaſe; but the ligaments, though ſuſceptible of the ſame alterations, are not ſo in the ſame degree. Now as a healthy child grows more in a given time, immediately after the birth, than it does in the ſame ſpace of time at any future period of its life, and as the progreſſive alteration in the texture of its parts is ſlower, in proportion as it advances in life; as the ligaments are, in every ſtage, leſs ſuſceptible of alteration than the other parts, and as a great alteration muſt be produced in the condition of the ligaments, to cure this diſeaſe, we ſee at once the importance of undertaking the cure as early in life as poſſible, and by this means, diminiſhing the trouble neceſſary to obtain, and the riſk of being diſappointed of ſucceſs.

The bones form the baſis of the body, give it ſolidity, and form the foundation on which thoſe parts are fixed, which enable it to move; the ligaments connect the bones together, firmly, where firmneſs is required, and admitting of certain degrees of motion, where motion is neceſſary; but the muſcles are the powers by which motion is performed: and ſuch is the connection between theſe three parts of the animal, that any derangement in the one, neceſſarily interrupts the functions of both the others. Having endeavoured to explain ſo much of the nature of bones and ligaments, as is connected with the diſeaſe in queſtion, it only remains to examine the muſcles of diſtorted feet, in the ſame point of view, to enable us to form correct opinions on the probability of curing them, in the various ſtages of the diſeaſe.

It has been uſual to divide the muſcles of the foot into flexors and extenſors, arranging under the firſt head the gaſtrocnemii, the peroneii, the tibialis poſticus, and plantaris; and to call the tibialis anticus the only extenſor muſcle of the foot. If this arrangement was correct, it would neceſſarily follow, that the foot is capable of only one kind of motion, *viz.* flexion and extenſion, directly forwards; but as we know that it is capable of other motions, when in its natural ſtate, *viz.* a degree of rotation, turning the toe inwards or outwards, and another motion, bending the whole foot upwards and inwards, it is evident, that the opinions that might be deduced from the above arrangement, would be erroneous; and as it is important, in conſidering this diſeaſe, that we ſhould underſtand the ſituation and action of every muſcle of the foot, I truſt I ſhall be excuſed for diſſenting from the common manner of claſſing them.

Of the muſcles called flexors of the foot, three, *viz.* the gaſtrocnemius, ſoleus, et plantaris, certainly do bend the foot, and, undoubtedly, have no other motion: they are, perhaps, the ſtrongeſt muſcles in the body, as they lift the whole weight of the body, every ſtep we take, and with a degree of force, proportioned to the action intended in running, jumping, &c. It is the apparent contraction of theſe muſcles, that, for want of a counteracting force, forms a moſt prominent feature of the diſeaſe, as it continually draws the heel upwards, and gives the appearance of preternatural ſmallneſs to the os calcis. But this contraction is not the original diſeaſe; for, notwithſtanding, as the patient advances towards maturity, the calf of the leg, which is formed of theſe muſcles, waſtes entirely away, for want of action, and the whole diſeaſe is then, perhaps, incurable. It is certain, that this miſchief is ſolely occaſioned by the bones of the foot, which have got into an unnatural poſition, and thus impede the action of the muſcles. So long as the ſtate of the bones does not render a cure hopeleſs, no inſurmountable obſtacles are oppoſed to it, by this apparent contraction of the muſcles of the leg.

Although the tibialis poſticus, and peroneus longus et brevis, certainly do, in ſome circumſtances, unite their action with that of the gaſtrocnemius, ſoleus, et plantaris, to bend the foot, they have other and diſtinct functions, in which the latter have no concern, and which deſerve particular attention; as the derangement of their natural actions, and the reſtoration of their natural powers, conſtitute moſt eſſential parts of the diſeaſe and the cure.

If we try to bend the foot, as much as poſſible, into the poſition of the common club-foot, we find it can be eaſily inclined very much that way. This is effected by the contractile action of the tibialii muſcles; the peroneii are relaxed and quieſcent. If we reverſe this action, it is effected by contraction of the peroneii muſcles, and *conſequent* relaxation of the tibialii; and both theſe motions are to be performed without bringing the gaſtrocnemii and plantaris into action. It is evident, that in theſe actions, the tibialii, and peroneii muſcles are, alternately, flexors and extenſors; and it is, therefore, manifeſtly incorrect, if not improper, to call the peroneii and tibialis poſticus muſcles, ſimply flexors of the foot.

Again, when we point the toe directly downwards, all the muſcles, called flexors of the foot, concur in this action, except the peroneus longus, which is chiefly employed in counteracting the tendency of the foot to turn inwards; this it certainly would do, if not ſo counteracted: and when the foot is raiſed directly upwards by the anticus, the peroneus longus combines with it in that action, as we find, in this ſituation, we can turn the toe inwards or out-

wards,

wards, according as we direct either of thoſe muſcles to act. As theſe actions of the muſcles of the foot muſt be evident to every one who will examine into them, it is difficult to conceive how the tibialis anticus can be called the only extenſor of the foot, and the ſix others denominated flexors; particularly the peroneus longus, whoſe action is ſo continually combined with that of the anticus, in raiſing the foot, that, in no inſtance, can the foot be extended in the natural way, if the action of the former is impeded in any manner.

The action of each muſcle has been examined ſeparately; but it is eaſy to conceive, that no one of them can act entirely by itſelf. When the foot moves, in any manner, all the muſcles are variouſly put in motion; nay, there are few actions can be performed, without the united power of the leg, foot, and toes: whence it muſt follow, that any derangement, in any of thoſe muſcles, muſt give riſe to a defective and irregular action in the whole limb, and, on many occaſions produce additional diſtortion. Thus the muſcles of the thigh, leg, foot, and toes, are always combined in thoſe actions that contribute to locomotion, though, from the nature of their connection, notwithſtanding the thigh may in adult patients be waſted, becauſe diſtortion of the foot renders the patient leſs capable of action, yet it is ſubject to no other derangement. But as the muſcles of the toes are much concerned in every action of the foot, every derangement of the parts of the foot muſt affect thoſe muſcles; and, in a healthy ſtate, their action is of conſequence to the motion of the foot itſelf; they are, therefore, as much objects of attention, in every ſtage of the diſeaſed, as thoſe of the foot itſelf.

There is manifeſt diſproportion in the power of the muſcles of the foot itſelf, conſidered ſimply on the idea of flexion and extenſion; becauſe the flexors muſt lift the weight of the body, at every ſtep we take, while the extenſors are only to lift the foot, and prepare it for a ſecond ſtep. There is a ſimilar diſproportion in the power and action of the muſcles of the toes, becauſe there is, likewiſe, a great difference in their intended functions; for, while the flexors only bend the toes downwards, the extenſor longus digitorum pedis, the peroneus tertius, the extenſor digitorum brevis, and extenſor pollicis proprius, not only extend the toes, but contribute much towards raiſing the foot, in conjunction with the anticus and peroneus longus. In this light, I believe it has not been uſual to conſider them; and it may, therefore, not be improper to explain this part of their functions.

The origin of theſe muſcles is on the tibia and fibula: their inſertion, in and about the toes, and their contractable power, is divided equally through their whole length; whence it is evident, that when theſe muſcles counteract the flexors of the toes, by contracting themſelves, they muſt neceſſarily aſſiſt in raiſing the foot, if it is lifted at the ſame time; acting upon the foot, with reſpect to the ancle joint, like a cord applied to the extremity of the long arm of a lever, and thus raiſing the weight, in the moſt advantageous manner. This may be aſcertained by any perſon endeavouring to raiſe the foot, at the ſame time the toes are kept down, by contraction of their flexor muſcles; and it will be found, that the foot cannot be raiſed, till the flexor muſcles of the toes relax, and the entenſors combine with the action of the anticus and peroneus longus, to produce the deſired effect.

Such is, nearly, the action of the muſcles of the feet and toes, when in their natural ſtate. We are now to examine, in what manner they deviate from this mode of action, when a foot is diſtorted in that way that has obtained the name of club-foot; and I ſhall therefore proceed to examine the worſt ſtage of that diſeaſe.

The firſt, and moſt prominent feature of this diſeaſe, when we conſider the ſtate of the muſcles, is the apparent contraction, and abſolute rigidity of the gaſtrocnemeii, plantaris, and tibialis poſticus muſcles, and the apparent incapacity for motion in the peroneii and muſcles of the toes. I call theſe circumſtances apparent, becauſe the contraction is not an abſolute diſeaſe: the poſition the bones have got into, prevents theſe muſcles from acting, and therefore their power of action ſeems to be loſt; what ſmall degree of motion remains in the foot, is performed by the anticus, which, in conſequence of the improper poſition the foot has taken, draws it more inwards and upwards. All theſe circumſtances, I have ſeen in the foot of a new-born child: and if others are not ſo bad at firſt, as they grow up, if no attempts are made to cure them, theſe circumſtances come on gradually, till the parts of the foot become incapable of any kind of motion, and the bulk of the leg diminiſhes, by the waſting of the muſcles, till it is very little more than the bones covered with the integuments.

During the time that the condition the of bones does not render the diſeaſe incurable, no inſurmountable obſtacle is oppoſed to the cure, by this apparently deſperate ſituation of the muſcles; for as no diſeaſe exiſts in the muſcles themſelves, as in paralytic affections, if the bones can be, and are reduced into their natural form, and relative poſition, the impediment to action of the muſcles is removed, and with proper attention, the action of theſe muſcles, as well as their natural form and relative proportion, in growing children at leaſt, may be reſtored, and thus the cure be rendered complete.

To illuſtrate theſe important facts, I took an opportunity to examine an adult patient, who had been born with one club-foot, and to relieve which no attempts had ever been made. I meaſured the perfect leg, as accurately as a line could be traced on the ſurface of the ſkin, in the courſe of ſoleus muſcle, from its origin at the upper part of the tibia, to the inſertion of the tendo achilles on the os calcis, and found, when the heel was raiſed as much as poſſible, the whole length was fourteen inches and a half; and when the heel was depreſſed

preſſed as much as poſſible, as in the act of climbing, the whole length was ſixteen inches and a half. I meaſured the anticus muſcle of the ſame leg, and found its moſt extended length ſeventeen, its moſt contracted length fifteen inches. The peroneus longus, in its moſt contracted ſtate, when the foot was turned outwards and upwards, as much as poſſible, meaſured nineteen inches and a half, and in its moſt extended ſtate, when the foot was turned inwards, and drawn up, as much as poſſible, in the poſition of the club-foot, by the action of the tibialii muſcles, it meaſured twenty-three inches. Theſe meaſurements were as accurately taken as poſſible; but are, perhaps, not perfectly ſo. They are, however, ſufficiently accurate for the preſent enquiry; and the reſult of them ſhews, that in mere flexion of the foot backwards and forwards, the anticus and gaſtrocnemei muſcles contract and expand to the ſame extent; but the alteration of the peroneus longus, in its two extremes of contraction and extenſion, is nearly twice as much as that of either the gaſtrocnemius or anticus.

It is difficult, from the peculiar functions of the peroneus longus, to name any muſcle as its particular antagoniſt. In the view I am now conſidering it, it ſeems to be counteracted by the tibialis anticus and poſticus; and it is certain, that neither of them contracts or extends, more than a fourth part of the length that the peroneus longus does in this action; and this variation from the general principles of muſcular motion *, which are, that antagoniſt muſcles move through equal ſpaces, in counteracting each other, gives it a peculiar character, that will afterwards require particular attention.

The diſtorted foot, in this patient, was turned inwards and outwards ſo much, that he ſtood with the os cuboides on the ground. The length of the ſoleus, from its origin to the inſertion of the tendo achilles on the os calcis, was thirteen inches and a half, and it was perfectly rigid. The length meaſured

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* I ſhould have ſaid, that part of muſcular motion which contributes to loco-motion in the human ſubject, as the principle is by no means univerſal.

meaſured in the courſe of the anticus was fourteen inches ; but the length of the peroneus longus, as nearly as it could be traced on the foot ſo deformed, was twenty-five inches and a half.

This is, perhaps, as correct a ſtatement of the difference between the length and ſize of the muſcles of a diſtorted foot, and a foot naturally of the ſame ſize, as can be obtained without diſſections, the opportunities for making of which very ſeldom occur. It proves, that in a diſeaſe which had taken place before the birth, and continued without any attempt to remove or diminiſh it for twenty-five years, which was the age of the patient when I ſaw him, the actual contraction of the gaſtrocnemii muſcles was but one inch more, in fourteen inches and a half, than the correſponding muſcles in the oppoſite leg continually contracted themſelves, in performing their natural functions. As we know that muſcular contractions, under ſome circumſtances, to a much greater extent, are overcome, we are authoriſed to conclude, that if the ſtate of the bones, in this caſe, had not rendered a cure abſolutely impoſſible, this contraction of the muſcles at the back of the leg might perhaps have been overcome.

If it is poſſible, that this contraction, in an adult, might have been overcome, after it had exiſted and been increaſing during the whole of his life; if we conſider, that contraction equally rigid to appearance, but leſs in degree, in proportion to the difference of the patient's ſize, takes place in all theſe caſes, and has been ſuppoſed to be the principal obſtacle to a cure, may we not conclude, that whenever the bones can be reduced to their natural ſtate, this condition of the muſcles of the foot will never, for a moment, retard the cure?

A circumſtance, more important in itſelf, and more important becauſe it ſeems to have been overlooked, is the alteration that has taken place in the exterior muſcles of the foot and toes, and more particularly in the peroneus longus, if I am not to call that an extenſor of the foot. It is upon the total removal of this circumſtance, that the perfection of a cure in this diſeaſe always depends; it is a point upon which ſo much depends, and upon which ſo little ſtreſs has been laid, even by thoſe who have been moſt intereſted in the welfare of thoſe patients I have under my care, that I truſt it will not be thought irrelevant if I attempt to diſcuſs it here.

Conſidering the muſcles only, two operations are neceſſary to effect a cure; one, by reducing the foot into its natural form, to remove the contraction that has taken place. In this ſtate, the foot appears well formed, but is uſeleſs, as to all purpoſes of loco-motion; it will remain in this poſition ſo long as it is held or bound, but upon removing the hand or bandage, immediately falls back into its former poſition. The ſecond operation is, therefore, neceſſary to keep it in the natural poſition, till the perfect uſe of all the parts is obtained, and then a relapſe is no more to be feared.

In the compariſon I have made between the diſtorted and the natural foot of a patient, it has been ſeen, that the peroneus longus on the diſtorted foot, was two inches and a half longer than the ſame muſcle on the natural foot, when extended to the greateſt degree that it could be. In the views I have given of the bones of a diſtorted foot, it has been ſeen, that from the poſition of thoſe bones, there are ſpaces between them at their upper ſurfaces, which at laſt become oſſified. In this caſe it is obvious, that all the muſcles and integuments muſt be longer than they are in a foot of the ſame patient, when in the natural ſtate.

By the operation of reducing the foot into its natural form, thoſe ſpaces are obliterated, by the reunion of the divided bones; of courſe the muſcles and integuments which cover them, are now longer than they ought to be, therefore they are incapable of performing their natural functions, till this ſuperabundant length is remedied. To know how this can be done, we muſt make ſome enquiries into the nature of muſcular action.

Muſcular motion, ſo far as it is connected with loco-motion, ſeems to depend upon this principle, that the flexor and extenſor muſcles of a member are equal in power, and the parts are enabled to perform their functions, continually, by the regular transfer of volition, from flexors to extenſors alternately; but the power of executing theſe functions, depends upon the correct and natural proportion of the parts to each other. Thus we have ſeen in the leg of which I have given the meaſurements, that the flexor and extenſor muſcles, in performing their natural motions, each alternately contracted and extended in the ſame degree: but in the diſeaſed leg, there was no motion; there was a poſitive contraction of the gaſtrocnemei muſcles of one inch: and there was an elongation of the peroneus longus, which made it two inches and a half longer than the ſame muſcle in the perfect foot. This caſe was incurable, from the age of the patient and the form of the bones; but if we ſuppoſe a caſe that is curable, though under the ſame circumſtances, as to form and poſition of the parts, the firſt operation would be to reduce the bones into their natural ſtate, by which the capacity for motion would be reſtored to the foot. The next would be, to produce extenſion of thoſe muſcles that had been contracted, which would be effected in a ſhort time, and thus one of its actions be reſtored to the foot; but the patient would ſtill remain lame, and in a great meaſure helpleſs, unleſs due care is taken to preſerve the foot in a proper poſition, till the exterior muſcles have likewiſe recovered their action.

I ſuppoſe the ſize of the muſcle of this foot correſponds with the meaſurement I have already given; we there ſee, the peroneus longus is two inches and a half longer than the ſame muſcle in the naturally-formed foot of the ſame patient, it is evident, that by reducing the foot to its natural form, in the ſhort time it has been effected by my operations, this muſcle muſt be left two inches and a half too long for its antagoniſts; or, in other words, by reduction of the foot to its natural form, the peroneus longus, and all the ſoft parts on the upper part of the foot, would form in wrinkles, and remain ſo, till by the growth of the patient, and confinement of the foot in a proper ſituation, the ſuperabundant parts are waſted away, and the whole limb will then regain and keep its natural form and action.

Having thus endeavoured to aſcertain the circumſtances which conſtitute the difference between the bones, ligaments and muſcles, in the diſeaſed and natural ſtate, conſidering them ſeparately, it now remains to conſider them as united into one whole. As each fibre is united to its fellow by cellular ſubſtance, till they conſtitute a muſcle, ſo the muſcles, ligaments, and bones, are united together, by different modifications of the ſame ſubſtance, to conſtitute a perfect limb. The tendons and ligaments themſelves are but modifications of the ſame ſubſtance, differing from each other. The cellular ſubſtance that unites them is in the ſimpleſt form; but would not anſwer the purpoſes requiſite for the perfect ſtate of the limb, without farther aſſiſtance; as it is evident, from the form and action of the parts, that their tendency to form ſtraight lines from their origin to their inſertion, would alter the form of the leg, and impede its action, unleſs aſſiſted by a peculiar proviſion for that purpoſe.

This proviſion is the general faſcia which firmly embraces the whole limb, to give ſtrength to every muſcle, and the crucial ligaments which are found at the acute angle made at the joining of the foot to the leg. Theſe parts I ſhall deſcribe in the words of the author *, from whoſe work I have already made many quotations.

‘ It is often uſeful, that an individual ‘ muſcle ſhould be incloſed in a tendinous ‘ ſheath, to give it ſtrength and firmneſs, ‘ and preſerve it in its ſhape. All muſ- ‘ cles, or almoſt all muſcles, form for them- ‘ ſelves individual ſheaths, ſuch as are ſeen ‘ incloſing the ſupra ſpinatus and infra ‘ ſpinatus of the ſcapula, the biceps hu- ‘ meri, and moſt of the muſcles of the leg ‘ and thigh; but it is eſpecially neceſſary; ‘ that the whole muſcles of the limb ſhould ‘ be encloſed in ſome ſtronger membrane ‘ than

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* J. Bell on the Bones, &c. p. 406, &c.

‘ than the common ſkin, both to give form ‘ to the limb, and ſtrength to its muſcles, ‘ and to keep the individual muſcles in ‘ their proper places, which otherwiſe ‘ might be luxated and diſplaced. And ſo ‘ the trunk of the body, the arm, the thigh, ‘ the leg, are bound each with a ſtrong, ‘ ſmooth, and gliſtening ſheath, formed ‘ out of the cellular ſubſtance, condenſed ‘ and thickened by continual preſſure. And ‘ this alſo is thicker and ſtronger, according ‘ to the need that there may be for ‘ ſuch a help. It is hardly to be diſtinguiſhed ‘ in the child, grows thicker and ‘ ſtronger as we advance in years and in ‘ ſtrength; and, in the arms of workmen, ‘ it grows particularly thick and ſtrong, ‘ increaſing in the back, ſhoulder, or limbs, ‘ according to the particular kind of labour. ‘ Theſe are the membranes which, ‘ by incloſing the muſcles like ſheaths, ‘ are called the vagina, or faſcia of the ‘ arm, the leg, the thigh,’ &c.

Again, ‘ Theſe tendons * muſt be bound ‘ firmly

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* Page 409.

‘ firmly down; for if they were to riſe ‘ from the bones, during the actions of the ‘ muſcles to which they belong, the effect ‘ of contraction would be loſt, and they ‘ would diſorder the joint, ſtarting out in a ‘ ſtraight line from bone to bone, like a bow ‘ ſtring over the arch of a bow. The ‘ ſame inanimate ſubſtance ſtill performs ‘ this office alſo; for the tendons of one ‘ muſcle often ſplit, to form a ſheath or ‘ ring for the next; or their tendons, after ‘ taking hold of the bone, ſpread their ‘ expanſion out over all the bones, ſo as to ‘ form an entire ſheath for the finger and ‘ toe; or there is a wide groove in the ‘ bone, which receives the tendons, and it ‘ is lined with a cartilage, and with a lu‘bricated membrane. The membrane ‘ comes off from the ſlips of the groove, ‘ or from corners or edges of the bone, ‘ paſſes over the tendons, ſo as to form a ‘ bridge, or often it forms a longer ſheath, ‘ as in the fingers, or where the peroneii ‘ muſcles paſs behind the ancle, and thus ‘ the vagina or ſheaths of the tendons are ‘ connected with the tendons, perioſteum,

‘ and other modifications of the common
‘ cellular membrane.’

Again, ‘ Theſe exterior tendons* are ‘ bound down by croſs-bands, reſembling ‘ the annular ligaments of the wriſt. ‘ The general facia of the thigh is continued over the knee and down the leg; ‘ it is much ſtrengthened at the knee, ‘ where it adheres to each point of bone; ‘ it deſcends very thick and ſtrong over the ‘ leg, binding and ſtrengthening the tibialis anticus, and exterior muſcles. The ‘ ſheath grows thinner towards the ancle; ‘ but where it paſſes over the joint, it is ſo ‘ remarkably ſtrengthened, by its adheſions to the outer and inner ancles, that it ‘ ſeems to form two diſtinct croſs bands, ‘ which going from the point of the outer ‘ ancle, acroſs the exterior tendons, to the ‘ point of the inner ancle, forms a ſtrong ‘ crucial ligament, reſembling the annular ‘ ligament of the wriſt; ſo that this which ‘ is called the *crucial ligament* of the ancle or ‘ foot,

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[*] Page 378.

‘ foot, is plainly but a ſtrengthening of ‘ the common ſheath.’

By this accurate deſcription it appears, that the faſcia is increaſed to its full ſtrength, if not actually created, by the action of the muſcles; and that the crucial ligaments are formed by thickening of the facia, at the angle made between the foot and the leg. The importance of the facia, and more particularly of the crucial ligaments, in keeping the muſcles in their proper poſition, ſo as to obtain the full effect of their contraction, when in action, is well underſtood. It remains to obſerve, that as the faſcia and ligaments are ſcarcely diſcernible in infants, and increaſe in every ſenſe, in proportion to the increaſe of action in the foot, if a child born with a club-foot is ſuffered to grow up with it, the faſcia muſt always be thin, becauſe the action of the muſcles decreaſes, they waſte, and therefore that, as well as the whole leg, becomes debilitated; and as the crucial ligaments are formed by compreſſion of the faſcia, by continual action of the foot in walking, there will be no crucial ligament, or at leaſt it will ſcarcely be diſcernible in a club-foot; and that, if we reduce a club-foot to the natural form, it will ſtill remain weak, for a time, in proportion to the age of the patient, till the crucial ligaments have acquired ſtrength to ſupport the muſcles in their natural action; therefore it is of as much conſequence on this account, as of any circumſtance reſpecting the bones or muſcles, that the cure ſhould be undertaken as early in life as poſſible.

I may now recapitulate that three diſtinct operations are requiſite to cure this deformity; firſt, to reduce the bones to their natural poſition, and natural form, if the patient's age has occaſioned any malformation to take place; ſecondly, to produce extenſion of any muſcle that has actually been contracted, or ſeems to be ſo from the poſition and conſequent inactivity of the foot; and, thirdly, to keep the foot bound in its natural poſition, till thoſe muſcles which have, from the circumſtances of the diſeaſe been weak and inactive, perfectly recover their tone and power, when, and when only, the cure will be compleat.

I may likewiſe be permitted to conclude, from what has been ſaid, that every caſe of this diſeaſe may be perfectly cured, before the patient is three years old; that after that age, ſome may ſoon become incurable; but that others may remain in a condition to be cured, till the age of ten, eleven, or twelve years old, and even to much later periods of life.

Having ſaid ſo much on that ſpecies of club-foot which takes place before the birth, it may not be thought uſeleſs, to make ſome remarks on thoſe which happen afterwards, and are by no means unfrequent. Two caſes I have related, and have known of many others. In doing this, we muſt ſuppoſe the feet to have been in a perfect ſtate; and, in ſome caſes, from debility, to have loſt a part of their powers, which has given riſe to deformity that becomes incurable; in others from palſy, to have loſt the whole of their powers, and for want of due aſſiſtance, only recovered a part of them, and thus terminated in incurable diſtortion.

The ancle joint has been called one of the ſtrongeſt in the human body. It may be ſo, but it is ſo no longer than while all its parts are in their perfect ſtate; for while other joints may ſuffer conſiderable injury from luxation, &c. without producing laſting miſchief, a very ſlight derangement of any of the numerous bones, ligaments, and muſcles of the foot, which are connected with this joint, may, and frequently does give riſe to incurable lameneſs, and has often occaſioned the loſs of a limb to the incautious ſufferer. To have a correct view of the manner in which this happens, and to be upon our guard againſt the numerous miſchiefs that may ariſe from neglecting ſeemingly trifling accidents, in children eſpecially, it is neceſſary again to examine, particularly, the whole of that joint, and parts connected with it; and by that examination we ſhall, perhaps, be enabled to form ſome rational conjectures, on the manner in which the common club-foot takes place before the birth.

It has been commonly ſuppoſed, that

the ancle joint owes more to its ſtrength to the form of the bones, than to the ſtrength of the ligaments; and it has been aſſerted ſo frequently, without contradiction, that the ancle joint cannot be luxated, without fracturing the head of the tibia or fibula, that it is now almoſt conſidered as a demonſtrated fact. Yet, perhaps, few things ſo generally believed, are ſo totally deſtitute of foundation; ſome found it on the peculiar ſtructure of the bones of the leg; others derive it from ſome paſſages in Mr. POTT's Treatiſe on Fractures. As the only paſſage in Mr. POTT's book which relates to this ſubject ſeems to bear a very different interpretation, I ſhall quote it at length below*; I ſhall proceed to examine the ſtate of the leg bones, ſo far as they are concerned in the ancle joint; and, I believe, ſhew, that this doctrine is unfounded.

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* ' Whoever will take a view of the leg of a ſkeleton, ' will ſee, that although the fibula be a very ſmall and ' ſlender bone, and very inconſiderable in ſtrength, when ' compared with the tibia, yet the ſupport of the lower ' joint of that limb (the ancle) depends ſo much upon ' this ſlender bone, that without it the body could not be ' upheld, nor loco-motion performed, without hazard of ' diſlocation every moment. The lower extremity of ' this

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'this bone, which deſcends conſiderably below that end 'of the tibia, is, by ſtrong and inelaſtic ligaments, firmly 'connected with the laſt named bone, and with the aſtragalus, or that bone of the tarſus which is principally 'concerned in forming the joint of the ancle. This 'lower extremity of the fibula has, in its poſterior part, 'a ſuperficial ſulcus, for the lodgment and paſſage of the 'tendons of the peronei muſcles, which are here tied 'down by ſtrong ligamentous capſulæ, and have their action ſo determined from this point or angle, that the 'ſmalleſt degree of variation from it, in conſequence of 'external force, muſt neceſſarily have conſiderable effect 'on the motions they are deſigned to execute, and conſequently diſtort the foot. Let it alſo be conſidered, that 'upon the due and natural ſtate of the joint of the ancle, 'that is, upon the exact and proper diſpoſition of the 'tibia and fibula, both with regard to each other, and to 'the aſtragalus, depend the juſt diſpoſition, and proper 'action of ſeveral other muſcles of the foot and toes; ſuch 'as the gaſtrocnemii, the tibialis anticus and poſticus, 'the flexor pollicis longus, and the flexor digitorum pedis 'longus, as muſt appear demonſtrably, to any man who 'will firſt diſſect, and then attentively conſider theſe 'parts.

If, indeed, we are to define luxation to be partial diſlocation of a joint by violence only, this opinion may be correct; for it ſeldom,

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'If the tibia and fibula be both broken, they are generally diſplaced in ſuch a manner, that the inferior extremity, or that connected with the foot, is drawn under that part of the fractured bone which is connected with the knee; making, by this means, a deformed, unequal tumefaction in the fractured part, and rendering the broken limb ſhorter than it ought to be, or than its fellow: and this is generally the caſe, let the fracture be in what part of the leg it may.

'If the tibia only be broken, and no act of violence, indiſcretion, or inadvertence be committed, either on the part of the patient, or of thoſe who conduct him, the limb moſt commonly preſerves its figure and length. The ſame thing generally happens if the fibula only be broken, in all that part of it which is ſuperior to letter A in the annexed figure (*viz.* about three inches from the bottom) or in any part of it, between its upper extremity, and within two or three inches of its lower end.

'I have already ſaid, and it will obviouſly appear to every one who examines it, that the ſupport of the body, ſeldom, if ever, happens, that ſuch violence is done to the joint, without fracture of the fibula, or that proceſs of the tibia which

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‘ body, and the due and proper uſe and execution of the ‘ office of the joint of the ancle, depend almoſt entirely ‘ on the perpendicular bearing of the tibia upon the aſtra-‘ galus, and on its firm connection with the fibula. If ‘ either of theſe be perverted or prevented, ſo that the ‘ former bone is forced from its juſt and perpendicular ‘ poſition on the aſtragalus; or if it be ſeparated by vio-‘ lence, from its connection with the latter, the joint of ‘ the ancle will ſuffer a partial diſlocation, internally; ‘ which partial diſlocation cannot happen without not ‘ only a conſiderable extenſion, or perhaps laceration of ‘ thoſe ſtrong tendinous ligaments, which connect the ‘ lower end of the tibia with the aſtragalus and os calcis, ‘ and which conſtitute, in great meaſure, the ligamentous ‘ ſtrength of the joint of the ancle.

‘ This is the caſe, when, by leaping or jumping, the ‘ fibula breaks in the weak part already mentioned, that ‘ is, within two or three inches of its lower extremity. ‘ When this happens, the inferior fractured end of the ‘ fibula falls inward, toward the tibia, that extremity of ‘ the bone which forms the outer ancle is turned ſome-‘ what outward and upward, and the tibia having loſt its ‘ proper ſupport, and not being of itſelf capable of ſteadily ‘ preſerving its true and perpendicular bearing, is forced ‘ off which forms the inner ancle. But if we are to underſtand by the term luxation, ſuch derangement of the parts of the ancle joint,

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'off from the aſtragalus inwards, by which means the 'weak burſal, or common ligament of the joint, is violently ſtretched, if not torn, and the ſtrong ones, which 'faſten the tibia to the aſtragalus and os calcis, are always 'lacerated; thus producing, at the ſame time, a perfect 'fracture and a partial diſlocation, to which is ſometimes 'added a wound in the integuments, made by the bone 'at the inner ancle. By this means, and indeed as a neceſſary conſequence, all the tendons which paſs behind 'or under, or are attached to the extremities of the tibia, 'the fibula, or os calcis, have their natural direction and 'diſpoſition ſo altered, that inſtead of performing their 'appointed actions, they all contribute to the diſtortion 'of the foot, and that by turning it outward and upward.

'When this accident is accompanied, as it ſometimes 'is, with a wound in the integuments of the inner ancle, 'and that made by the protruſion of the bone, it not unfrequently ends in a fatal gangrene, unleſs prevented 'by timely amputation; though I have ſeveral times ſeen 'it do very well without. But in its moſt ſimple ſtate, 'unaccompanied with any wound, it is extremely troubleſome to put to rights, ſtill more ſo to keep it in order, 'and unleſs managed with addreſs and ſkill, is very fre-'quently joint, whatever may be the occaſion of it, the above-mentioned opinion is by no means true; for we frequently ſee diſtortions of the

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‘ quently productive both of lameneſs and deformity ever ‘ after.

‘ After what has been ſaid, a farther explanation ‘ why this is ſo, is unneceſſary; whoever will take a curſory ‘ view of the diſpoſition of the parts, will ſee, that it muſt ‘ be ſo. By the fracture of the fibula, the dilatation of ‘ the burſal ligament of the joint, and the rupture of thoſe ‘ which ſhould tie the end of the tibia firmly to the ‘ aſtragalus, and os calcis, the perpendicular bearing of ‘ the tibia on the aſtragalus is loſt, and the foot becomes ‘ diſtorted. By this diſtortion, the direction and action ‘ of all the muſcles already recited are ſo altered, that it ‘ becomes (in the uſual way of treating this caſe) a ‘ difficult matter to reduce this joint, and the ſupport of ‘ the fibula being gone, a more difficult one to keep it in ‘ its place, after reduction. If it be attempted with ‘ compreſs and ſtrict bandage, the conſequence is often ‘ very troubleſome, as well as painful ulceration of the ‘ inner ancle, which very ulceration becomes itſelf a ‘ reaſon, why ſuch kind of preſſure can be no longer ‘ continued; and if the bone be not kept in its place, ‘ the lameneſs and deformity are ſuch, as to be very fa- ‘ tiguing to the patient, and to oblige him to wear a ‘ ſhoe the foot to a great extent, and in which there certainly never was any fracture. Such diſtortions are the ſubjects of the preſent enquiry.

Upon examining the bones of an adult foot it appears, that the end of the fibula which forms the outer ancle, is more than half an inch nearer the ground, than that proceſs

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' ſhoe with an iron, or a laced buſkin, or ſomething of ' that ſort, for a great while, or perhaps for life.'

*Pott on Fractures, &c. p.* 406.

This is the only paſſage in Mr. POTT's book, which can be ſuppoſed to juſtify the notion, that the ancle joint cannot be luxated, without fracture of the fibula, or internal proceſs of the tibia; and yet it does not ſupport ſuch a doctrine. He ſays, that where there is fracture of the lower part of the fibula, there muſt be diſlocation of the aſtragalus, with rupture of ſome ligaments, and diſtenſion of others; but he does not reverſe the poſition, by ſaying, that where there is diſlocation of the aſtragalus, there muſt be fracture of the fibula or tibia. What is more to the purpoſe, and juſtifies me in quoting his opinion at length is, the clearneſs with which he demonſtrates, that any derangement of the muſcles, tendons, or ligaments of the foot, will produce lameneſs, often incurable, if not timely prevented.

proceſs of the tibia which forms the inner ancle; and that part of the aſtragalus which lies next the fibula, is perfectly flat. From this peculiar formation of theſe bones, it ſeems unlikely, that the ancle joint ſhould be diſlocated, or ſuddenly luxated, ſo as to turn the foot outwards, without, at the ſame time, fracturing the fibula above, but near the joint. It is, perhaps, from the ſame formation of the bones, that the diſtortion of the feet, which ſometimes takes place before the birth, and is included under the denomination of *varii originates*. The caſe is not very common; but in thoſe I have ſeen, the feet were turned outwards and upwards, ſo that what ſhould be the ſuperior part of the foot was laid againſt the outſide of the leg, and the bones of the leg perfectly doubled upwards, to bring the foot into that ſituation.

If this diſeaſe is occaſioned by peculiar poſition of the fœtus in utero, it would ſeem to take place in this way. The foot may, by ſome accident, be turned out-

wards,

wards, and by continual ſtruggles to regain its natural ſituation, the ſtrength of the foot is brought to act upon the weakeſt part of the bones of the leg, which bend gradually, and at laſt are folded into the poſition they are found in at the birth; the foot being flattened more or leſs, in proportion to the degree of compreſſion it has ſuffered, and the length of time it has been confined. In the caſes I ſaw*, the arch of the foot was nearly obliterated, and the whole foot nearly as flat as a common hand.

On the inſide, the aſtragalus is ſecured in its natural ſituation, by that proceſs of the tibia which forms the inner ancle. This, as I have already obſerved, does not deſcend ſo near the ground as the fibula, by more than half an inch in an adult foot, and therefore the aſtragalus is much leſs ſecurely fixed in its place on this ſide, than on the other. If, therefore, diſlocation, or violent luxation of the ancle joint, ſo as to turn the foot inwards, does take place, it may frequently happen, that this proceſs of the tibia may be fractured: but, as the foot is capable of moving ſideways, as well as ſuffering the leg to move directly forwards over it, and the proceſs of the tibia does not impede its motion to the inſide, ſo completely as the fibula does to the outſide, it may frequently be violently luxated if not actually diſlocated in this direction, without fracture of the tibia.

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* I have ſeen three of theſe caſes. One was ſent me by Mr. Hooper, from the Mary-le-bone Infirmary: this child died a few days after I firſt ſaw it, and before I could make any attempt to relieve it. The other two were brought to me during one of my viſits to Ireland, and when I was on the point of leaving that country, ſo that I could make no attempt to relieve them; but am perſuaded, if they could have been placed under my care, they might have been cured.

It is from this facility of the foot to turn inwards, and to ſome peculiarity in the form of the bones of the leg, that the origin of the common club-foot is to be attributed. It is well known, that the leg bones of young children, for ſome time after the birth, are not ſtrait; they are curved outwardly, from the poſition in which the fœtus is naturally laid, and that curve diſappears as the child grows up. But in every caſe of club-foot that has come under my obſervation, the bones of the leg have been remarkably ſtraight; ſo much ſo, as to excite the attention of nurſes, &c. who are in the habit of ſeeing children, and certainly would not have made the obſervation, if the fact did not exiſt. Whether this peculiar ſtraightneſs of the leg bones does, or does not account for the origin of this diſeaſe, may be underſtood from the following conſiderations:

If we reflect on the poſition of the fœtus in utero, we ſhall ſee that the outſide of the leg and foot, while in that poſition, deſcribes a ſegment of a circle, or at leaſt of an ellipſis; and from the form of the impregnated uterus, this elliptical tendency of the legs and feet, as well as of the whole fœtus, is inevevitable. Now, in the ordinary courſe of things, if a ſtraight line was drawn from the knee of the fœtus, the whole leg and foot would be found to deviate from that line to a certain degree, and form a regular ſection of a curve ; but if, from whatever cauſe, the bone of that leg is perfectly ſtraight in its whole length, all the curve, which is neceſſary to allow the fœtus to lie in its ſituation, inſtead of being equally divided through the whole length of the leg and foot, is confined to the foot only, which, in conſequence, forms an acute angle with reſpect to the leg. It is more acute, in proportion to the degree of compreſſion it has ſuſtained, and the length of time it has been confined in that ſituation: and as the foot is compoſed of numerous ſmall bones, which in the fœtus, are looſely connected together, in conſequence of this accident, it eaſily aſſumes thoſe forms we ſee in ſuch variety in incipient club-foot.

Thus we ſee the connection between the bones which form the ancle joint is remarkably ſtrong; ſtrong enough to bear a continuation of the moſt violent exertion, ſo long as all the parts are in perfection; but when any derangement in the muſcular action takes place, the importance of each part to the well being of the whole is ſo great, that a very ſlight ſprain, or even accidents more trifling, may give riſe to lameneſs, and incurable deformity.

I have already explained, why the flexor muſcles of the foot are ſo much ſtronger than their antagoniſts, the extenſors: and it reſults from this fact, that where general debility of the limb takes place, from any cauſe, its effects will be firſt and moſt ſenſibly felt in the weakeſt part. For this reaſon, if a child, after it has walked, becomes debilitated by illneſs, by over exerciſe, or by any accident, ſo much of that weakneſs as falls upon the foot and leg, will moſt affect the outſide of them: the peronei muſcles will be leſs able to ſupport the foot properly; they will ſoon give way, and, by repetition of this failure, be continually ſtrained, till at laſt they will loſe all power of action. The bones, from the circumſtances of their connection with each other, will favor and increaſe this defect, till themſelves feel the effect of it; their relative poſition is altered, and by negligence and time, they will at laſt acquire all the deformity that takes place in (if I may ſo call it) the natural club-foot.

This will moſt frequently happen from weakneſs, from violent ſprains, or from other violent accidents; becauſe where ſuch accidents happen, their effects naturally fall on the weakeſt parts. But there are caſes the reverſe of all this; caſes, where the muſcles inſide the leg, which are much the ſtrongeſt, become too weak to ſupport the body under its own preſſure; where the bones, which are ſo well ſecured as to be commonly thought incapable of diſlocation on the outſide the joint, without being fractured, fall gradually into a condition ſimilar to what would be produced by luxation. This may, on ſome occaſions, be the effect of mere debility; but it is more frequently the produce of negligence, or of groſs abſurdity in the management of children; a conjecture which derives much ſtrength from the fact, that theſe defects are moſt frequent in females of the middling and higher claſſes of life. A young lady learns to dance; it is proper that ſhe ſhould do ſo, as few actions are more graceful than that of turning out the toes, &c. as ſhe walks: but ſhe is perhaps obſtinate or negligent, and will not do ſo; ſhe is, therefore, made to ſtand in the ſtocks, with her feet turned out as much as poſſible. The anatomiſt muſt ſee, that the effect of this practice is by twiſting the foot outwards, to force the aſtragalus againſt the end of the fibula, by the reſiſtance of which the ligaments which connect the bones of the foot and ancle joint are weakened; the muſcles are, in conſequence, ſtrained; and at laſt permanent debility, and often deformity, is produced. If this does not happen, or if ſhe is made to ſit in the ſtocks, another defect, at leaſt as bad, may be produced. By turning the feet outwards in this manner, the knees are inevitably bent inwards; and very conſiderable diſtortion may, in this way, be produced. If the habit of turning out the feet muſt be acquired, it will be beſt done by the practice of dancing or marching, under the inſpection of proper teachers. What is ſo learnt, will add ſtrength to the limbs, as well as grace to their motions; but whatever is done by ſuch machinery, which is too generally and improperly uſed, will generally produce debility, and too often deformity.

When a leg becomes paralytic, all its powers are loſt; it becomes flaccid, and may be turned in any direction that does not exceed the extent of its natural motions; but when the paralytic affection is removed, it recovers its powers by degrees; and as the flexor muſcles of the foot are much ſtronger than the extenſors, they have acquired a conſiderable degree of power, before the power of the latter is ſenſibly reſtored; and as a patient in this ſituation begins, or at leaſt attempts to walk, as ſoon as poſſible, and long before the natural power of all the muſcles is reſtored, the obvious effect is, that a halting, imperfect kind of motion takes place, in conſequence of the defective action of the muſcles of the foot; and, through the reſt of his life, he drags a debilitated, and almoſt uſeleſs limb after him; or obſtinate contraction of the flexor muſcles, and conſequent deformity of the foot takes place, which, in many of theſe caſes at leaſt, might be prevented, by a very moderate degree of attention, as the methods by which the above-mentioned diſeaſes may be obviated, are deducible from the ſame general principles, by the application of which I have been uniformly ſucceſsful in curing the common club-foot. I truſt I ſhall be excuſed for having inſerted theſe brief remarks here, though they do by no means include all that can be ſaid on the ſubject. The concluſions I wiſh to draw from them are, that in young children, very trifling accidents may, if neglected, produce incurable deformity; and that moderate attention to ſuch accidents, which are too frequently called only a little weakneſs, that will go off of itſelf, will prevent any ſuch conſequences from ariſing: and that when paralytic patients are recovering from the effects of that diſeaſe, if the neceſſary attention is paid to keep their legs and feet in their natural poſitions, at the ſame time that the original diſeaſe is attended to, many would perfectly recover the uſe of their limbs, who, for want of mechanical aſſiſtance in due time, remain cripples for life.

## CASE XVI.

Miss ——, aged five years, had but indifferent health, and been neglected by her nurſe. The knees were both bending inwards, in the common way. This gradually increaſed, till the bones of the leg, about three inches below the knee, began likewiſe to bend: when her knees were cloſe together, the inſide of the feet were eight inches apart. The inſtruments I have already deſcribed were perfectly adapted, and left to the management of the nurſe in the country, who totally neglected them. When this was diſcovered, ſhe was taken home, and better taken care of; but the inſtruments were never applied in the night, notwithſtanding I repeatedly preſſed the importance of inceſſant application, in a caſe ſo bad as this. The conſequence has been, that at the end of two years ſhe is *almoſt* well, and continues to wear the inſtruments in the way ſhe has already done; but I have no doubt, on comparing this with other caſes that have fallen under my obſervation, that if the whole plan propoſed had been properly followed, ſhe would have been quite well in half the time that has been already employed in the cure.

## CASE XVII.

Master ——, aged two years and a half, had the right knee much bent, like the preceding caſe; but the bones of the leg were not affected. By the recommendation of Doctor Clarke, he was put under my care. The inſtruments I uſually apply were adapted to both legs, as there was reaſon to fear the left would bend, if the right leg only had been ſupported; and as it was not thought neceſſary to keep them continually in uſe, they were only worn in the day time. In ſix months, the knees were both perfectly ſtraight; but it was determined to uſe the inſtruments ſome time longer, to prevent a relapſe. There can be no doubt, that if the inſtruments had been continually uſed, this patient would have been well in much leſs time; but as the diſtortion was not originally of the worſt kind, and the patient's friends were deſirous that he ſhould avoid the inconvenience of wearing the inſtruments at night, even at the expence of being long under cure, the additional time can hardly be regretted, ſince he was ſo ſoon and ſo completely cured.

## CASE XVIII.

Master ——, had always been a very delicate child, and at the age of two years, his knees were ſo much bent inwards, that when they were cloſe together; his feet were five inches apart, and he was ſcarcely able to walk at all. By the application of the in-

inſtruments, properly adapted, and under the care of a nurſe in the country, where I had few opportunities of ſeeing him, he got perfectly well in about fourteen months.

## CASE XIX.

Miss ——, aged two years and a half, was remarkably ſmall and delicate, in every reſpect. Her knees began to bend from the time ſhe firſt walked, and this debility encreaſed ſo much, that when I firſt ſaw her ſhe could ſcarcely walk at all, and when ſhe ſtood, her feet were ſix inches apart, while her knees were cloſe together. By ſteady perſeverance in every part of the plan recommended, her knees were perfectly ſtraight at the end of ſix months. She had become very active, and more healthy; but as there was reaſon to fear ſhe might relapſe, if the inſtruments were too ſoon taken away, ſhe was directed to continue to uſe them ſome time longer.

## CASE XX.

Miss ——, aged three years, and healthy in every reſpect, had the left knee very much bent inwards, but without diſtortion of the bones. There was much reaſon to believe this deformity was occaſioned by the indolence of a careleſs nurſe-maid, who conſtantly carried the child ſwinging over her left arm. By experience in other caſes, I was juſtified in adviſing the application of inſtruments to both legs, in this; but it was not ſubmitted to, and that which was applied to the diſtorted leg, was ſo careleſsly treated, and ſcarcely attended to at all, that no benefit was derived from it, till the increaſing diſtortion proved the neceſſity of perſeverance.

Still the inſtrument was only applied to one leg, and that only in the day time. At the end of fourteen months, the leg, originally diſtorted, had become almoſt ſtraight, and that which at firſt was quite ſtraight, is now a little bent, ſo that now ſhe has both knees in ſome degree bent; but the parents are ſo well ſatisfied with her ſituation, that the inſtrument is laid aſide.

There can be no doubt, that if the plan I adviſed had been regularly followed, this child would have been perfectly cured; but as the parents havé choſen to act, they have, perhaps, only laid a foundation for future deformity.

## CASE XXI.

Miss ——, aged five years, and remarkably ſmall of her age, had always very bad health, and from ſome cauſe that was not explained to me, had loſt both the power and inclination to walk, for ſome time. When ſhe began to recover, her endeavours to walk cauſed her knees to bend, for which reaſon ſhe was then not permitted to ſtand on her legs, till proper aſſiſtance was giving. After the inſtruments were properly adapted, ſhe was adviſed to try ſea bathing, for the benefit of her general health. In leſs than two months, I was requeſted to make ſome neceſſary alterations in the inſtruments, and informed, ſhe was then able to take much exerciſe, was become active, more healthy, and no doubt was entertained, by thoſe who had ſeen the alteration already produced, that ſhe would perfectly recover.

## CASE XXII.

Master ——, ſix years of age, had both knees much bent inwards. His parents had been adviſed to get what are commonly called leg-irons for him. Theſe were ſo improperly conſtructed, that the tops of them reſted againſt the femor, about two inches above the knee joint. By the ſedulous uſe of theſe ingenious inſtruments, for about twelve months, the thigh bones became bent, at thoſe parts that were preſſed upon by the tops of the irons, and had ſomething the appearance of bones that had been broke and badly ſet, and the knees were more bent than when the irons were firſt applied. By the application of my inſtruments for ſix months, the diſtortion of the knees was removed; but the incurvation of the bones ſtill remains, though it is probable that, by perſeverance in the ſame plan, even that deformity will be cured.

## CASE XXIII.

Miss ——, aged two years and a half, remarkably ſmall of her age, apparently healthy, and very active, had both the knees much bent inwards. As there was no other circumſtance to account for this diſtortion, and ſhe was able to go alone at the age of ten months, it was probably occaſioned by putting her ſo very early on her feet. The neceſſary inſtruments were applied, and ſeduloully uſed, by which means ſhe was enabled to walk with tolerable eaſe. She was ordered to the ſea-ſide, where ſhe bathed conſtantly, and in ſomething more than ſix months, by perſeverance in the plan recommended, her legs became perfectly ſtraight.

## CASE XXIV.

Miss ——, aged twenty-two years, had had both the knees very much bent inwards from her infancy; *ſo* much, as very ſenſibly to impede her walking. In conſequence of my advice, ſhe determined to try what alteration could be produced by thoſe inſtruments, which I had found ſo effectual in younger patients. They were properly adapted to her caſe, and ſeduloufly applied for ſeveral months. The curvature at the knees has been much diminiſhed; ſhe finds ſhe can walk ſo much more, and with ſo much more eaſe with, than ſhe could poſſibily do without them, and to uſe her own expreſſion, ſhe finds them ſuch a comfortable ſupport to her, that ſhe has determined to perſevere in uſing them, for ſake of the temporary ſupport ſhe receives, and not without hopes of obtaining a perfect cure.

## CASE XXV.

Miss ——, aged nineteen, had, in her infancy, had ſome diſtortion of the legs, of which I could obtain no authentic and certain account. The beſt I could get was, that her family lived a conſiderable diſtance from London, and when the diſtortion in her legs was perceived, were adviſed to procure leg-irons for her, which they did. A difference of opinion aroſe, with reſpect to the application of them; one perſon inſiſting that they ſhould be placed on the outſide, another that they ſhould be on the inſide the legs. In this dilemma, it was determined to try them on one ſide, and if that did no good, to move them to the other ſide the legs. This plan was actually executed; but, unfortunately, the legs got worſe, on whichever ſide the irons were applied, therefore they were entirely laid aſide.

At the time I ſaw her, the toes were pointing inwards, conſidering their ſituation relative to the feet. The knees were bending conſiderably outwards; but all the bones, both of the legs and thighs, were perfectly ſtrait. She was healthy, tall, and inclined to be corpulent, and in conſequence of this peculiar poſition of the legs, &c. was incapable of walking more than half a mile at once, without being quite fatigued; complained of extreme pains on the outſide of her knees and ancles, and was therefore prevented from taking much exerciſe, otherwiſe than in a carriage. From the circumſtances of her caſe, it is evident that ſhe muſt either become more helpleſs, by declining all attempts to walk, or by walking, increaſe the diſtortion of the knees and ancles, and thus ultimately increaſe her debility. Under theſe circumſtances, any aſſiſtance that could alleviate any of the inconveniencies this patient laboured under, became an object of conſequence to her. The plan I propoſed, was either to attempt a cure, by endeavouring to reſtore the limbs to their natural poſition and action, or merely to ſupport them in their preſent ſituation, ſo as to enable her to take proper exerciſe, with as little inconvenience as poſſible. The inſtruments applied were calculated to produce both theſe effects, if they were attainable; and I have the ſatisfaction to ſay, ſhe has been materially ſerved by them. She has now worn them more than a year, and is now able to walk four miles at a time, without being much fatigued. In ſhort (I uſe her own words) ſhe is ſo much more active and comfortable to herſelf with, than ſhe ſhould be without them, that ſhe is determined never to lay them aſide, unleſs it ſhould happen that they perfectly reſtore her legs to their natural ſtate; and thus render the farther uſe of them unneceſſary.

By the ordinary modes of treatment, nothing could have been done in the two preceding caſes, except, perhaps, applying heavy, unwieldy leg-irons, which would encumber, at leaſt as much as they would aſſiſt the wearer: but by the inſtruments I have applied, a poſitive increaſe of the power of walking has been produced, to a very great degree;

and though in one ſenſe, it may be ſaid to be only temporary, it is ſtill a temporary good, that may be continued to any length of time, at the will of the patient. But as there is no phyſical impoſſibility to prevent the form and ſtrength of the limbs, in both caſes, from being perfectly reſtored, it is ſurely an improvement of conſequence, in the treatment of ſuch diſeaſes, that can produce ſo much temporary benefit, and afford well founded hopes of permanent relief, to perſons who could obtain no benefit whatever from any other method of cure.

## CASE XXVI.

Miss ——, aged two years, was recommended by Mr. Cruikshank to me, for aſſiſtance. She had long been under his care for complaints, which it is needleſs to particulariſe; but, in addition to them, ſhe was incapable of ſupporting or directing her head in any particular poſition; it always fell backwards, and lay almoſt motionleſs on her ſhoulders. As there was reaſon to ſuppoſe this defect would increaſe, and produce other deformities, it was determined to ſupport her head by my ſpinal machine, which was done for two years before the defect diſappeared.

During my attendance on this caſe, I remarked a peculiar defect in her manner of walking. She ſeemed as if the tendo achilles in each leg was ſuddenly contracted, ſo as ſometimes to force her to walk on her toes, while, at others, ſhe could walk flat on her feet. I recommended ſome precautions, which if duly followed, might have prevented the ill conſequences of this defect; but I believe they were not complied with.

Several months afterwards, I was called to aſſiſt this child. The tendo achilles of one leg was much, and rigidly contracted; the toes were drawn inwards, and ſhe walked on the outſide of her foot, which had aſſumed much of the form and appearance of the common club-foot. I adapted proper inſtruments, by means of which, in a few months, this foot perfectly recovered

covered its form, poſition, and uſe. Some time afterwards, the other foot was affected in the ſame way, and was perfectly recovered by the ſame treatment.

Without pretending to aſcertain the prediſpoſing cauſe of this patient's diſtortions, I may be permitted to obſerve, that if the precautions I recommended (and which perhaps were thought unneceſſary) had been followed, the feet would not have been diſtorted, as they afterwards were; and if they had been farther neglected, they would have terminated in two club-feet, as completely as that of Caſe XIV, page 48.

## CASE XXVIII.

Miss ——, aged four years, had very indifferent health, with much enlargement of the bones of the wriſts, ancles, &c. beſides other ſymptoms of rachitis, and the knees ſo much bent inwards, that ſhe could not walk with eaſe.

Mr. Taylor, Surgeon, of Southampton Buildings, recommended her to me. I adapted the neceſſary inſtruments, gave proper inſtructions for the care of them, and ſhe was immediately taken into the country, for the benefit of her health. At the end of three months, I enquired after her, and was told, that in the country they could not get ſhoes made properly to wear with the inſtruments, and therefore they had not been uſed. The knees were worſe than when I ſaw them at firſt. Shoes were now procured, and the inſtruments applied. They then began to mend, and did ſo for ſome time; but in conſequence of ſome very improper advice, were laid aſide before ſhe was well, though even ſtill ſhe is much better than when I firſt ſaw her.

## REMARKS

## *On the preceding Caſes of Diſtortion in the Knees, &c.*

I HAVE not thought it neceſſary to engrave any of the drawings I made from the patients whoſe caſes I have related, as the diſtortion of the knees, which is the principal circumſtance in them all, is exactly repreſented in the ſecond plate, belonging to the annexed Specification; and as the method of cure is fully detailed in the ſame paper, few remarks can here be made in addition to it. This diſtortion is occaſioned by weakneſs in the ligaments and tendons, which connect the bones of the leg and thigh at the knee joint. In conſequence of this debility, the legs become unable to bear, without ſinking under the weight of the body; of courſe, when the bones of the leg do not bend, the knees come in contact with each other, and the legs diverge ; or the knees diverge, and the feet approach to each other. All theſe diſtortions may be conſidered, either as ſimple relaxation of the ligaments and tendons, on one ſide the joint, as in very young children, when they are recent, or as relaxation on one ſide, and contraction on the other ſide the joint, as in thoſe who have had the complaint long, and grown perhaps to maturity with it. In whichever point of view it may be conſidered, I have ſhewn it may be eaſily remedied ; and am, perhaps, juſtified in believing it is, in no caſe, incurable.

Thoſe who are prone to wonder, and thoſe who are determined to be ſceptical, may be equally ſurprized when told, a diſtortion of the knees, to ſuch an extent as to place the feet at the diſtance of ſeven or eight inches from each other, may be perfectly cured in a few months ; but that ſurprize may be diminiſhed, by an accurate examination of the facts, which may be thus demonſtrated.

Suppoſe a perpendicular column, eighteen inches high (which is nearly the heigth of the leg and thigh of a child about three years old) and two inches in diameter, divided in half, horizontally. While theſe parts lie directly upon each other, the whole would be perpendicular; but if, by any accident, they ſhould be ſeparated from each other on one ſide, and on the other remain in contact, and if, by any means the upper half retained its upright ſituation, the lower would diverge from its perpendicular ſituation, in proportion to its length, and the diſtance to which the ſeparated parts are removed from each other; and if there were two ſuch divided columns, diverging from each other in oppoſite directions, the diſtance between the lower ends would be doubled, and a conſiderable ſeparation between them produced, by a very trifling alteration in the relative ſituation of thoſe parts, which actually occaſion the whole deviation from the natural form. This is, nearly, the ſituation of the legs of a child, diſtorted by the knees bending inwards; and it is, hence, eaſily ſeen, that a very trifling relaxation of the ligaments of the knee-joint, and the tendons connected with them, may produce very conſiderable deformity of this kind.

In ſuch diſtortions, when recent, two operations are requiſite to effect a cure, *viz.* to replace the bones in their natural relative poſition ; and to retain them there, till the ligaments and tendons connected with the knee-joint, have recovered their natural power of ſupporting the weight of the body properly on the legs.

In recent caſes, where the diſtortion has been brought on ſuddenly, or at leaſt, quickly, by debility, the reduction will be eaſily effected ; for the ſame debilitated ſtate of the parts, which have occaſioned them to give way, will not oppoſe any obſtacle to any rational attempts to return the legs to their natural form, and then time, with the aſſiſtance of cold baths, &c. will enable them to recover, perfectly, their natural functions. But when, from length of time the diſeaſe has exiſted, age of the patient, or any other circumſtance, the parts have become rigid or contracted, it will require conſiderable caution to reduce them to their natural poſition ; but ſtill it is poſſible to do ſo.

As the degree of relaxation requiſite to produce this diſtortion is not great, ſo the degree of rigidity or contraction neceſſary to retain it in its worſt form, is not greater than the relaxation which occaſioned it. From this view of the ſubject, and from what we know of the effects of mechanical action upon tendinous contractions, it is not too much to conclude, there are few, if any caſes, even in adults, that are abſolutely incurable : and from a knowledge that the mode of treatment I have invented may be adopted to every poſſible caſe, it would, perhaps, not be unwarrantable to conclude, that every caſe, which in its nature is not incurable, may be cured by it. But I ſhall, at preſent, confine myſelf to that claſs of patients, about which there can be little difference of opinion. I have related the reſult of many of theſe caſes; the particulars of the proceſs will be found in the Specification of my Patent; but as I have thought it right to differ, in ſome points of practice, from opinions generally received, it is incumbent on me here to account for the practice I have adopted.

When the common leg-irons were uſed in ſuch caſes, they were fixed upon ſhoes, and it was, therefore, neceſſary to remove them when the patient went to bed. From this circumſtance it has been deduced, that *they ought*, and, therefore, whatever may be uſed as a ſubſtitute for them, ought likewiſe to be taken off, when the patient goes to bed. It is by ſuch reaſoning, if it may be ſo called, that error is perpetuated, and rational improvement impeded; for there can be no difficulty in making it appear, that this practice, whatever ſyſtem of treating theſe diſorders it may be applied to, will render more than double the time requiſite to perform a cure, than would be neceſſary, if the plan of conſtant application, which I recommend, be adopted.

For reaſons which I have given in a former publication, I think the common leg-irons are totally uſeleſs, if they are applied with a view to perform a cure. They may have ſome little utility, if applied to afford a trifling ſupport, and thus prevent the farther progreſs of the diſtortion ſubſequent to the application; but I contend, that this ſupport is as neceſſary while the patient is laid in his bed, as while he is walking about, though this application of it is to be juſtified upon different grounds from the former.

It is underſtood, that theſe applications are made to ſupport the weight of the body, and prevent the weakened knee-joints from bending ſtill more under the preſſure; and from theſe premiſes a concluſion is drawn, that as the weight of the body is not thrown upon the legs while the patient is ſupine, this ſupport, during that period, is unneceſſary. The truth of this argument may be allowed in its full extent; for there are other facts to be conſidered, which have a ſtrong claim to our attention.

Whenever there is diſtortion in the legs, or elſewhere, the patient will always ſleep in a poſition that favors, and therefore has a ſtrong tendency to increaſe the deformity. If the inſtruments, of whatever deſcription they may be that are uſed, during the day, to counteract the diſtortion, are capable of producing that effect, if their action is merely limited to reſtrain the progreſs of the deformity, it muſt be performed by compreſſion on the knees, the moment, therefore, theſe are removed, and the patient lain in bed, the knees will fall, more or leſs, into their deformed poſition, and by this means, great part of the benefit that had been derived from them in the day, will be counteracted by the relaxed poſition of the parts during the night; but if any rational attempt is made, during the night, to continue the reſtraint that they are kept under in the day, the cure will be effected in leſs than half the time it will require to perform it, if the ſame means are employed during the day only.

If this argument is allowed to be well founded, when applied to the common leg-irons, it is much more ſo, when applied to the inſtruments I have invented for curing theſe diſtortions. By them, a conſtant uniform action may be kept up, ſo long as is neceſſary to effect the cure. If a cure is to be effected by this action, there can be no doubt, that the more conſtantly the action is kept up, the ſooner its ultimate effect will be produced. This is ſo evident, that farther arguments will be deemed unneceſſary to prove, that the inſtruments deſcribed in the annexed Specification, for curing diſtortions in the knees of children, or others, ought to be conſtantly and regularly applied, during the night, as well as the day, till the cure is completed.

Two objections, however, have been made, with ſome plauſibility, to this practice; firſt, the great uneaſineſs it muſt occaſion to the patient; and, ſecondly, that

ſome

ſome caſes are too ſlight to require this treatment.

To the firſt it may be anſwered, that whatever we are not accuſtomed to is unpleaſant, till habit has reconciled us to it; therefore a child may be reſtleſs and uneaſy, for the firſt night or two after it is put into this ſituation, but will not, afterwards, feel the leaſt inconvenience or uneaſineſs from ſleeping in theſe inſtruments. To the ſecond it muſt be replied, that I have conſidered the whole ſubject in one general point of view, and ſtated, *generally*, what appears to me the beſt mode of treatment. It muſt be determined, in practice, by the circumſtances of particular caſes, what exceptions ſhall be made to the general rule.

If I were required to lay down a rule on this ſubject, it ſhould be nearly in the following way.—In very young children, when the diſtortion at the knee is ſmall, when the patient's health is ſo indifferent as to be injured by want of reſt, even for two or three nights, the inſtruments ſhould only be uſed in the day time; ſince it will be better to protract the cure for ſome time, than to take the chance of ſuch evils by accelerating it. Even in caſes where there is no reaſon to dread ſuch effects, if the over tenderneſs of parents ſhould render them unwilling to ſubject their children to ſuch treatment, no very cogent reaſons can be given for inſiſting upon it, as it is a queſtion of prudence, which they alone have a right to decide; and if they chuſe that a longer time ſhould be employed in effecting a cure, rather than adopt the moſt expeditious mode, we may, without impropriety, purſue that plan. But in very bad caſes, where there is much contraction, or at leaſt rigidity to overcome, where the diſtortion is of long ſtanding, and the patient, perhaps, farther advanced in life, the moſt rigid, but indiſpenſably neceſſary plan muſt be purſued, by keeping up the neceſſary action continually, by conſtantly uſing the neceſſary inſtruments, both day and night. I have ſeen many caſes cured, by adopting this practice, that never would have been benefitted in any other way; and

I cannot heſitate to ſay, that in all ſuch, the queſtion, whether the inſtruments ſhall be kept in continual uſe, during the time of performing the cure, or not, is the ſame as, whether the patient ſhall be cured by, or derive no advantage from the uſe of them.

## CASE XXVIII.

In the month of April, I was deſired by Mr. Knight to attend the ſon of a perſon of high rank. Dr. Underwood and Mr. Knight were preſent. The child was two years and an half old, was remarkably ſtrong and healthy, but had the bones of the legs bending outwards, and the toes conſiderably turned in, in conſequence of the curve. *Fig.* 1 and *Fig.* 2, annexed to the Specification, though not drawn from this caſe, will convey a very correct idea of it.

To remedy theſe defects, I propoſed to apply the inſtruments deſcribed in the Specification,

cification, with an addition that would enable me to place the feet in any ſituation that might be requiſite, and vary that ſituation at pleaſure. This propoſal was approved of both by Dr. U. and Mr. K., and therefore was carried into execution.

As the diſtortion was not of the very worſt deſcription, it was not thought adviſeable to keep the inſtruments continually in uſe, they were therefore taken off at night, and applied in the morning. As this mode of treatment did not require continual attendance, and as, from the rank of the patient, we were certain that every direction given would be implicitly obeyed, it was only requiſite for me to ſee him occaſionally, to make ſuch alterations as were neceſſary in the progreſs of the cure.

This caſe went on as well as could be wiſhed. The inſtruments did not, in the leaſt, incumber or prevent the patient from taking his uſual exerciſe, and the legs ſtraightened ſo quickly, that in the beginning of September, when Dr. UNDERWOOD and Mr. KNIGHT were deſired to examine the child, they were of opinion, that he was perfectly cured, and therefore directed all the inſtruments to be laid aſide.

As incurvation of bones of the legs has juſtly been held to be incurable by any means before known, and as this was the firſt caſe in which I had occaſion to try this mode of treatment, which I have invented, it was peculiarly gratifying to me, that it ſhould be tried ſo fairly, under the obſervation of Dr. UNDERWOOD and Mr. KNIGHT, as their opinions on the ſubject will be received as ſufficient proofs of its efficacy.

## CASE XXIX.

SOON after I was called to the above caſe, I was conſulted by Mr. DELCOUR of Rathbone Place, whoſe daughter was in a ſimilar ſituation. The curve of the legs was exactly like it; but the child by no means ſo healthy. The promiſing appearance of ſucceſs in the former induced me to try the ſame means to effect a cure in this caſe, and with equal reaſon to expect a favorable event. For four months that ſhe wore them, the legs improved ſo faſt, that it was ſoon intended to lay the inſtruments aſide, as uſeleſs, when a ſudden alteration in the ſtate of her health made it neceſſary to diſcontinue them, before the cure was complete. This ill ſtate of health continues; but it is propoſed, as ſoon as poſſible, to reſume the application of the inſtruments; and there is no doubt, from what has already been done, that the ſucceſs will be complete.

As the cure of this caſe is, at preſent, imperfect, and as I wiſh to eſtabliſh every fact relative to this hitherto incurable deformity, on the firmeſt baſis, I have requeſted Mr. Delcour to give me his opinion, which will be found to confirm the facts I have already ſtated.

‘ Mr. Delcour preſents compliments to ‘ Mr. Sheldrake, has received the continuation of his obſervations, and finds

‘ that part of them which are relative to ‘ his daughter’s caſe, is exactly conſiſtent ‘ with the ſtricteſt truth.’

‘ Rathbone Place,
‘ Sept. 4, 1797.

## CASE XXX.

In May, 1797, I was conſulted by a Lady, whoſe daughter was in a ſituation ſimilar to the two preceding. She was two years and a half old, very delicate health, and had the bones of both legs bending directly outwards. The ſame inſtruments were applied as in the former caſe; but as an objection was made to the continued uſe of them, they were only applied in the day time. By this imperfect mode of application, I was rather ſurprized to find they were viſibly better in three weeks, and at the end of four months were perfectly recovered.

## CASE XXXI.

During my ſtay in Dublin in 1796, a Lady applied to me with her daughter, in the ſame ſituation as the laſt deſcribed caſe. The ſame kind of inſtruments were adapted, and proper inſtructions given for the uſe of them. The child was frequently brought for me to examine her legs; and during the ſhort period of my ſtay, the amendment was ſo quick and ſo viſible to every one, that no doubt could be entertained of her ſpeedy and perfect recovery. I have ſince been informed, that in leſs than ſix months ſhe was perfectly cured.

## REMARKS

### *On Incurvation of Bones of the Leg.*

ALTHOUGH it is certain, that the form of bones, in young children, may be altered by accident or diſeaſe, and it may be juſtly concluded from this fact, that it is poſſible, by counter alterations, to remove the effects of ſuch diſeaſes, yet it is perfectly notorious, that no rational method

of

of curing theſe diſtortions has been practiſed. Under theſe circumſtances, it is with much ſatisfaction I am enabled to announce a method that, with due perſeverance, promiſes to be ſucceſsful, in every caſe where ſucceſs is poſſible. The preceding caſes prove, that it has been ſucceſsful when fairly tried, and the demonſtrations in the annexed ſpecification will explain the principles, by the application of which the cure of theſe diſtortions have been effected ; ſo that it is only neceſſary, in this place, to add ſuch remarks on the cauſes of this diſeaſe, as could not, with propriety, be included in the ſpecification.

It is a fact, generally known to anatomiſts, that the central part of the cylindrical bones is firſt oſſified, and, in young children, is of a more ſolid texture than the other parts of the ſame bones : and it has been obſerved, and may be fairly accounted for, from the preceding fact, that when incurvation on the bones of the leg takes place, the central part of them is leaſt affected,

affected. They generally bend towards the lower part; and it happens, not unfrequently, that when ſuch diſtortions are long neglected, they proceed ſo far as to let the bones of the leg, when moved ſideways, touch the ground. I have, in one caſe of the direct curve, ſeen the lower part of the leg ſo bent, as to lie in contact with the upper part of the foot. When a diſeaſe of this nature is ſuffered to go to ſuch extent, it is perhaps not reaſonable, for many reaſons, to expect a perfect cure: if any thing can be done to alleviate the moſt diſtreſſing effects, a point of conſequence to the patient is gained; and if they are too far gone, even for this degree of mitigation, notices of ſuch caſes may ſerve as reaſons to caution the negligent, and prevent them, by careleſsneſs, from ſuffering their children to ſink into ſimilar ſituations.

The little attention that has been given to theſe diſeaſes, by profeſſional men, has left the treatment of them too much in the hands of the weak and the ignorant of various deſcriptions; and the way in which ſuch people muſt talk on a ſubject they cannot underſtand, has given riſe to vague and unſatisfactory opinions, concerning the facts of the diſeaſe and the circumſtances that have produced them. Thus we have been told, the weight of the body occaſions the legs to bend under it; and thoſe who have ſtrength of imagination enough to think they are ſure of this, are willing to believe, the weight of the body is the only circumſtance deſerving notice, either in preventing or in curing diſtortions of the legs. With them, peculiarity of formation, irregular muſcular action, or ill habits of various kinds, are of no importance, though there is abundant reaſon to believe, that theſe principally contribute to the formation of this diſeaſe, or, at leaſt, have a ſtrong tendency to deprive the weight of the body, and ſetting children too ſoon on their legs, of the reputation they have acquired for being the ſole cauſe of all this claſs of diſtortions in the legs of young children.

In ſpeaking of the prediſpoſing cauſes of club-feet, I have endeavoured to explain, that from the poſition of the fœtus in utero, the legs of children, from the thigh downwards, aſſume a particular curve, which in the ordinary courſe, diſappears as the child grows up. I have, at this time, a child under my care, that was born with one club-foot. The bones of that leg ſeem as ſtrait as they could be laid by a rule; the bones of the other are curved in the natural way. Here is a different conformation of the two legs of this child; and it muſt be allowed, that whichever we may chuſe to call the natural form, the other is a peculiar original formation, tending to deformity. The extreme ſtraightneſs of the leg, I imagine, for reaſons already given, occaſioned the diſtortion of the foot; and if it deviated a little farther from its natural form, the leg itſelf might have been diſtorted: on the other hand, if the oppoſite leg had been a little more curved, than the legs of children *commonly* are at the birth, that peculiarity might have laid the foundation of a deformity, like that at preſent under conſideration.

If the force with which the muſcles of the leg and foot are capable of acting, be conſidered, we ſhall be able to deduce the origin, or at leaſt the increaſe of ſome diſtortions of the legs, from peculiar actions of thoſe muſcles; for example, that in which the bones of the leg bend directly forwards. In all caſes of this kind that I have ſeen, the tendo achilles has been much more rigid than in the well-formed leg; the calf of the leg very thin; and the gaſtrocnemii muſcles almoſt incapable of acting. I might, perhaps, be juſtified in attributing the origin of this diſtortion to the action of theſe muſcles operating upon the bones, under peculiar circumſtances; but I ſhall, at leaſt, be permitted to obſerve, that after the diſtortion has taken place, the contraction of the gaſtrocnemii muſcles, and tendo achilles, muſt, from their poſition and action, perpetually tend to increaſe the curve of the bones of the leg; and this being once admitted, certainly confirms the former conjecture, that the action of theſe muſcles operating upon the weakeſt parts of the ſoft bones, may, either of itſelf, or in conjunction with other cauſes, produce many of theſe deformities.

I have ſaid thus much, in hopes of making it appear, that other cauſes, beſides preſſure from weight of the body, may produce theſe diſtortions. It is, however, by no means my intention to ſay, that the gravitating power of the body is of no importance in the formation of theſe diſeaſes; on the contrary, I am perſuaded, that as a ſecondary cauſe, it is concerned in them all; for if we conſider the legs as columns intended to bear the weight of the body, and that, by whatever accident their form is ſo altered, as to diminiſh their natural ſtrength, the preſſure from the weight begins to act in depreſſing them, and continues, with accelerated force, till, by artificial means, the farther progreſs is prevented.

If the principles I have laid down for the treatment of theſe diſtortions be inveſtigated, it will be found that I begin by ſupporting the legs in their preſent condition:

dition: the acting power is then placed on the moſt ſolid part of the leg bones, which form the baſis from which it acts; the bandages are then faſtened upon the weaker extremities, which brings the ſprings into action, and the re-action of which is, by this means, conſtantly exerted in correcting the curve; by this means every poſſible advantage is obtained in the application, and every poſſible benefit may be expected in the event.

In this, more than in any other claſs of diſtortions, there is occaſion for unremitting perſeverance. It is not the queſtion, whether a debilitated joint ſhall be enabled to bear the weight of the body; but whether a bone that is bent out of, ſhall be reſtored to its natural ſhape. In canvaſſing the former ſubject, it may be diſputed, whether any ſupport is neceſſary, except when the patient is upon his legs; but, in the latter, it cannot be denied, that the curve having once taken place, muſt remain, in whatever ſituation the patient may be placed, till the proper means are applied to eradicate it: and that it will be eradicated early, in proportion to the conſtancy with which the means are applied, is a ſelf-evident propoſition.

## SPECIFICATION

## OF A PATENT, &c.

'TO ALL TO WHOM THESE PRESENTS
'SHALL COME, I, TIMOTHY SHELDRAKE, the
'younger, of No. 50, in the Strand, in the
'county of Middleſex, Truſs-maker, do ſend
'greeting: Whereas his moſt Excellent Ma-
'jeſty, King George the Third, by his letters
'patent, under the great ſeal of Great
'Britain, bearing date at Weſtminſter

did give
'and grant unto me, the ſaid TIMOTHY
'SHELDRAKE, my executors, adminiſtra-
'tors, and aſſigns, his ſpecial licence, ſole
'privilege, and authority, that I, the ſaid

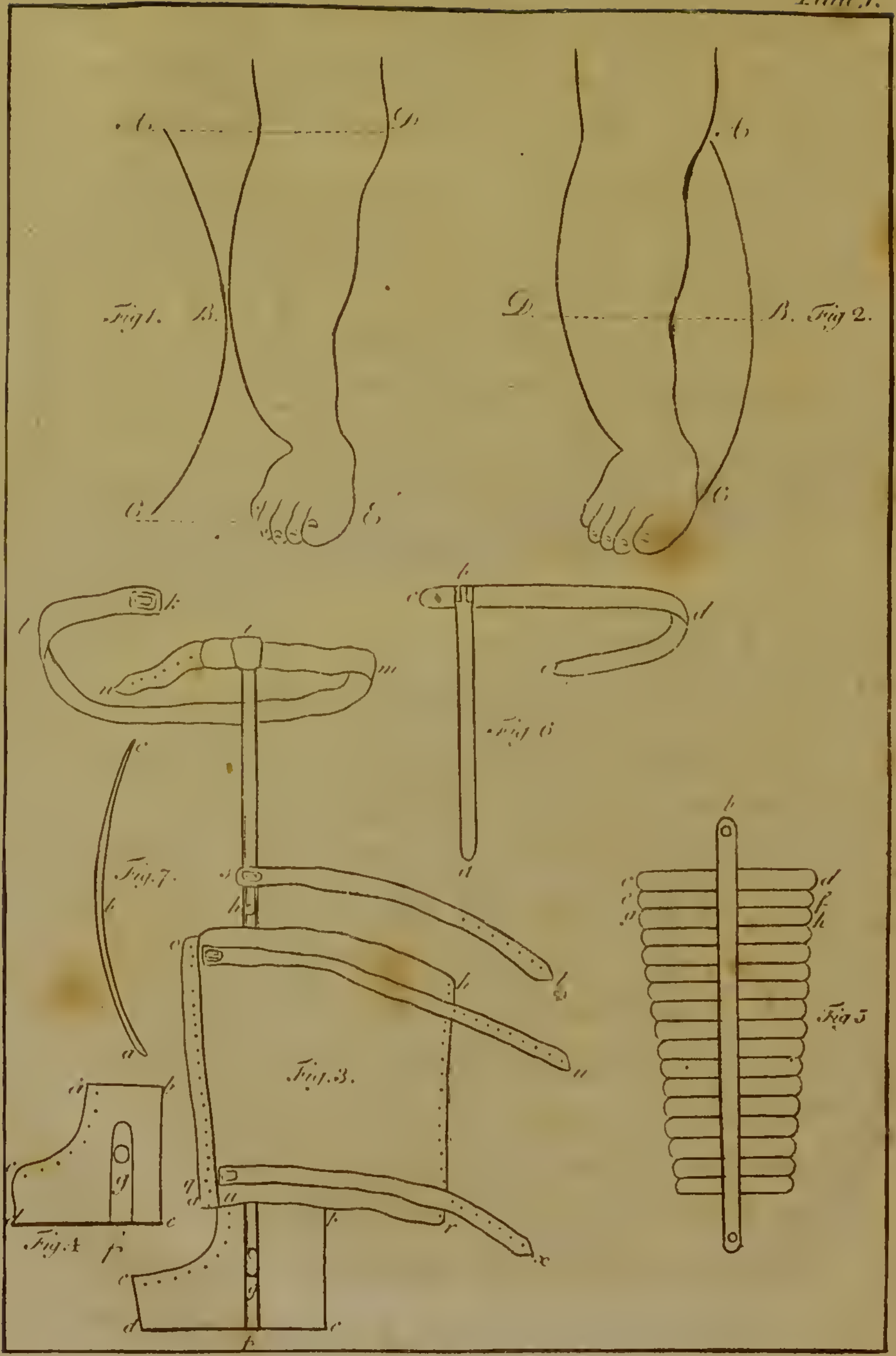
‘ TIMOTHY SHELDRAKE, my executors, adminiſtrators, and aſſigns, during the term of years therein expreſſed, ſhould and lawfully might make, uſe, exerciſe, and vend, within England, Wales, and the town of Berwick upon Tweed, my new invented method of curing all the deformities of children, or others, which ariſe from, or are connected with diſtortion in the form or combination of bones that exiſt in the deformed part; in which letters patent there is contained a proviſo, obliging me, the ſaid TIMOTHY SHELDRAKE, under my hand and ſeal, to cauſe a particular deſcription of the nature of my ſaid invention, and in what manner the ſame is to be performed, to be inrolled in His Majeſty's High Court of Chancery, within one calendar month next and immediately after the date of the ſaid recited letters patent, as in and by the ſame (relation being thereunto had) may more fully and at large appear. ‘ NOW KNOW YE, That in compliance with the ſaid proviſo, I, the ſaid TIMOTHY SHELDRAKE, do declare, that my ſaid invention

‘ vention is defined and deſcribed as fol-
‘ lows; that is to ſay, My new invented
‘ method of curing all deformities, or diſ-
‘ tortions in the legs, feet, arms, or other
‘ parts of children, or others, (provided
‘ they are not in their nature incurable)
‘ whether ſuch deformities or diſtortions
‘ ariſe from, or are connected with the
‘ improper form of one or more bone or
‘ bones, or by the improper combination
‘ of two or more bones, or by the impro-
‘ per form, and improper combination of
‘ any number of bones that exiſt in the
‘ deformed or diſtorted part, is effected by
‘ the continual, repeated, and varied ap-
‘ plication of a ſpring or ſprings, to be
‘ conſtructed, adapted, and applied with
‘ bandages, and by inſtruments, in ſuch
‘ manner, that the ſpring or ſprings which
‘ conſtitute the efficient part of ſuch ap-
‘ plications ſhall be conſtantly acting, to
‘ correct the diſeaſe, and ſhall have their
‘ powers varied, modified, and increaſed,
‘ as circumſtances ſhall require, ſo as to
‘ diminiſh the deformities or diſtortions, by
‘ degrees, until they are finally eradicated.

‘ This is the general nature of my invention, a more particular deſcription of it, ‘ and the manner in which it is to be performed, I will now ſtate, in various inſtances, as particularly and diſtinctly as ‘ the nature thereof will admit. In the ‘ firſt place, I ſhall illuſtrate the method ‘ of treating thoſe diſtortions or deformities, which ariſe from the improper form ‘ of bones, by explaining the treatment of ‘ curvature in bones of the leg, which is ‘ one of the moſt frequent diſeaſes of that ‘ deſcription; whether the bones bend inwards, outwards, or forwards, is of no ‘ conſequence, as the principle on which ‘ the remedy is to be applied is the ſame in ‘ all.—Figures 1 and 2, hereunto annexed, ‘ repreſent a child's leg bending outwards; ‘ the lines marked with the letters *a. b. c.* ‘ in both figures, repreſent the curved ‘ ſpring, intended to correct this deformity. ‘ It is evident, that if this ſpring is, by ‘ bandage or otherwiſe, at *a. d.* and *c. e.* in ‘ figure 1, or *b. d.* in figure 2, brought ‘ into contact with the leg, the inſide of ‘ the knee as at *d.* in figure 1, and *a.* in

‘ figure

Plate 1.



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‘ figure 2, and bottom of the leg which ‘ correſpond with the ends of the ſpring, ‘ will form reſting points for the ſpring to ‘ act from, while its re-action, by producing ‘ preſſure on the projecting part of the ‘ curve of the leg, reduces the bone towards its natural ſtate. The ſame effect ‘ will be produced by either of theſe methods, the difference between the modes ‘ of producing the effect being, that in ‘ figure 1 the bandages *a. d.* and *c. e.* form ‘ the reſting points, and preſſure is made ‘ upon the curve of the bone by the ſpring ‘ at *b.*; but in figure 2, the ends of the ‘ ſpring *a.* and *c.* form the reſting points, ‘ and the re-action of the ſpring produces ‘ preſſure from the bandage *b. d.* upon the ‘ curve of the bone. I ſhall now proceed ‘ to ſhew, particularly, the manner of ‘ conſtructing the inſtrument for curing ‘ the deformities of the leg, upon the principles already laid down; by which means, ‘ thoſe who may hereafter practiſe this ‘ method, will be better enabled to determine, in what manner they will apply ‘ theſe principles, in the cure of ſuch dif-

‘ tortions or deformities as may be entruſted ‘ to their care. The inſtrument I uſe to ‘ cure curvature in bones of the leg, is ‘ conſtructed as in figures 3, 4, 5, 6, and ‘ 7, hereunto annexed, and is deſcribed in ‘ manner following, that is to ſay; the ‘ foot piece *a. b. c. d. e.* in figure 3 and 4, ‘ is made of calf ſkin, or any other mo‘derately ſtiff leather, in form of a com‘mon half-boot, and to lace in front, with ‘ the ſole of iron, or any other ſtrong ‘ metal; and to cure a bone curved like ‘ figure 1, I fix on the outſide of this ſole, ‘ a piece of iron, ſteel, or other convenient ‘ metal, *f. g.* in figures 3 and 4, to go in ‘ a perpendicular direction, as high as the ‘ ancle joint at *g.* in figures 3 and 4; with ‘ this I connect, by means of a joint, an‘other piece of iron, ſteel, or other con‘venient metal, *a. b.* in figure 5, to go as ‘ high as the knee; upon this I rivet (but ‘ it may be otherwiſe fixed) tranſverſely, as ‘ many pieces of tin, or other metal *c. d.* ‘ *e. f.* &c. in figure 5, each about half an ‘ inch wide, as will reach from the ancle ‘ to the knee, and ſo long, as to be equal

‘ to about half the circumference of the
‘ leg, the whole way. I continue another
‘ piece of iron, ſteel, or other convenient
‘ metal, *a. b.* in figure 6, and *h. i.* in figure
‘ 3, to the hip joint; this is connected
‘ with the leg, by a joint at the knee *h.*
‘ in figure 3, and *b.* in figure 5, to allow
‘ the knee to move in its natural directions,
‘ and is fixed by a ſwivel joint to allow the
‘ hip to move in its natural direction, to
‘ a bandage *c. d. e.* in figure 6, and *k. l. m.*
‘ *n.* in figure 3, that goes round the waiſt,
‘ and on the outſide of that iron, ſteel, or
‘ other convenient metal, *a. b.* in figure 5,
‘ which bears the tranſverſe pieces of tin,
‘ I fix a ſpring *a. b. c.* in figure 7, whoſe
‘ curve is ſimilar to the line marked *a. b. c.*
‘ in figures 1 or 2; this I call the ſkeleton
‘ of the inſtrument.—The foot-piece is
‘ lined with any ſoft materials, to prevent
‘ it from galling the foot; the ſide of the
‘ leg is guarded in the ſame manner, and
‘ covered with ſtrong leather, or any other
‘ convenient material, to go all round the
‘ leg; the reſt of the bandage may be
‘ covered in the uſual manner. To apply

‘ this apparatus, the foot muſt firſt be laced ‘ tight into that part that is intended to ‘ receive it, *a. b. c. d. e.* in figure 3.—The ‘ part figure 5, which is compoſed of tranſverſe pieces of tin, &c. is then to be ‘ moulded, as near to the form of the leg ‘ as poſſible; the leg bandage *o. p. q. r.* in ‘ figure 3, is to be laced round the lower ‘ part of the leg, as tight as it can be ‘ borne, and fixed to remain ſo, by means ‘ of the ſtrap *w. x.* in figure 3; the upper ‘ part is then to be laced, as tight as may ‘ be, and fixed to remain ſo, by means of ‘ the ſtrap *r. u.* in figure 3, and the ſtrap ‘ *s. t.* in figure 3, faſtened round the knee, ‘ to keep it in its place; and, finally, the ‘ bandage *k. l. m. i. n.* in figure 3, to be ‘ made faſt round the waiſt. If the principles I have laid down are attended to, ‘ it will be evident, that the ſkilful application of this bandage, according to ‘ the proceſs I have deſcribed, the ſpring ‘ *a. b. c.* in figure 7, which is the efficient ‘ part, and which is, as before ſtated, fixed ‘ or faſtened to figure 5, will be brought ‘ into action upon the curve of the leg, ‘ and

Plate, 2.

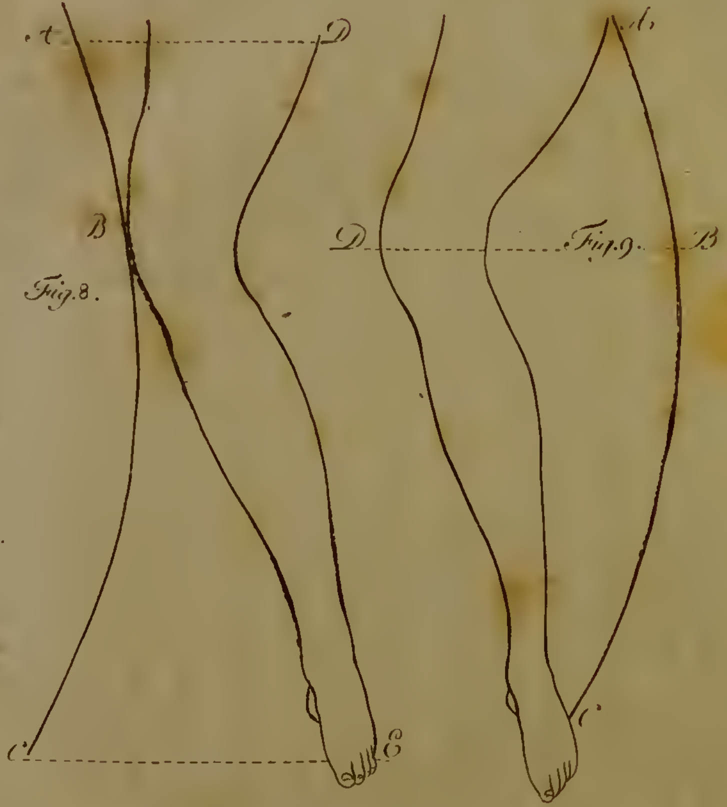

Fig. 8.

Fig. 9.

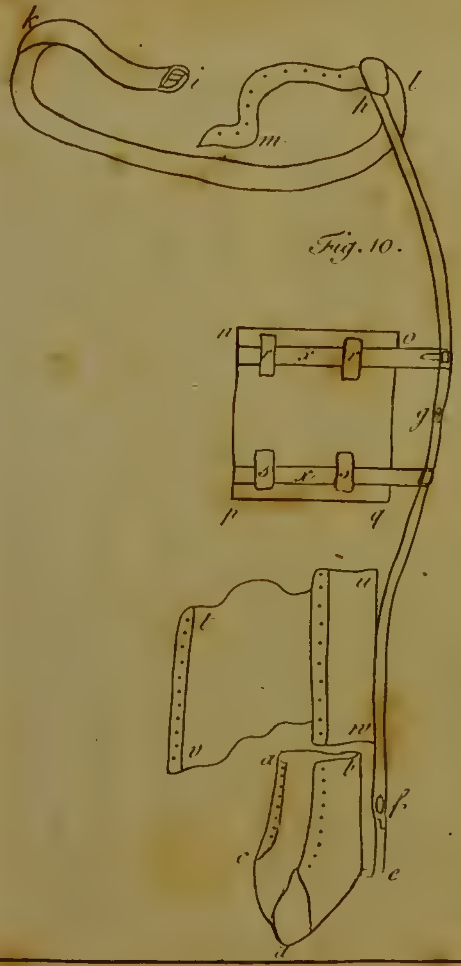

Fig. 10.

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‘ and by regulating the bandages, &c. that ‘ action may be modified and increaſed, ‘ until the bone is made perfectly ſtraight. ‘ The above is the inſtrument I make and ‘ uſe, when the ſpring is to be placed on ‘ the outſide of the leg; when the ſpring ‘ is to be placed on the inſide of the leg, ‘ the inſtrument I make and uſe differs ‘ only in this, that it is made to reach as ‘ high only as the inſide of the thigh will ‘ allow, and is faſtened round the thigh, by ‘ a bandage fixed at the top of the inſtru‘ment, inſtead of being faſtened round ‘ the waiſt, by the bandage fixed by the ‘ ſwivel joint to the top of the inſtrument. ‘ In the ſecond place, I ſhall exemplify ‘ the method of curing deformity or diſ‘tortion from improper combination of ‘ bones, by explaining the method of ‘ treating that deformity, which is occa‘ſioned by the knees bending inwards, ‘ while the bones of the leg and thigh are ‘ individually perfect and ſtraight; which ‘ is one of the moſt frequent ſpecimens of ‘ this claſs of diſeaſes. Figures 8 and 9, re‘preſent a leg of this kind; the lines *a. b. c.*

‘ in each figure, repreſent the curved ſpring ‘ intended to cure this deformity. In deformities ‘ or diſtortions from curvature of ‘ bones, the bones alone are objects for attention, ‘ every thing that covers them being ‘ merely paſſive; but in deformities, or ‘ diſtortions from improper combination of ‘ bones, the muſcles, tendons, and ligaments ‘ connected with them, become equally ‘ objects of attention, being ſometimes ‘ merely deranged, in conſequence of ‘ the improper combination of bones, but ‘ at other times ſome diſeaſe or derangement ‘ in the muſcles, tendons, or ligaments, ‘ have been the original cauſe of ‘ the deformity. In the deformity repreſented ‘ in figures 8 and 9, where the derangement ‘ of the connecting ligament of ‘ the joint, the loſs of power in the muſcles ‘ of the leg, and conſequent diminiſhed capacity ‘ for loco-motion in the patient, ‘ are merely conſequences of the derangement ‘ in the relative poſition of the ‘ bones, the means propoſed to remove ‘ that original diſeaſe will likewiſe obviate ‘ all the conſequences; but in that claſs

‘ of deformities which originate in ſome defect of the muſcles, tendons, or ligaments in the parts affected, our attention muſt be principally directed to ſupply or remedy this defect which is the producing cauſe, or the conſequences can never be removed, or even palliated with much effect; that it is propoſed to do effectually by my invention. I exemplify the method of conſtructing inſtruments for curing diſeaſes of the latter claſs, occaſioned by improper combination of bones, according to the method I have invented, by deſcribing the manner of making inſtruments to cure that deformity which is occaſioned by the knees bending inwards, as drawn in figures 8 and 9. I make the foot piece *a. b. c. d. e.* in figure 10 of this inſtrument, exactly the ſame as deſcribed in the preceding caſe in figures 3 and 4; to this I connect, by means of a joint, a ſpring *f. g. h.* in figure 10, to go from the ancle joint at *f.* to the hip at *h.* if I place the inſtrument outſide the leg, as in figure 9, which I think is the preferable mode; or from the ancle to

‘ the top of the thigh, if on the inſide, as ‘ in figure 8. The ſpring *f. g. h.* is made ‘ of two pieces, united by a joint parallel to ‘ the knee, as at *g.* in figure 10, to allow ‘ the knee to move in its natural direction. ‘ If theſe inſtruments are for both legs, ‘ they are connected by a bandage round ‘ the waiſt, as I have already deſcribed, as ‘ *i. k. l. m.* in figure 10. Between the ‘ ſpring and the leg, I place a ſplint of metal, ‘ or other convenient ſubſtance, as in figure ‘ 3, faſtened to the inſide of the ſpring, to ‘ cover as much as may be neceſſary of that ‘ ſide the leg, to guard it from preſſure ‘ from the ſpring, and to form one of the ‘ reſting points; the other is formed by ‘ the bandage *i. k. l. m.* in figure 10, to ‘ which the ſpring is fixed on the hip. If ‘ the inſtrument is to be placed on the inſide the leg, it is made as high only as ‘ the inſide of the thigh will allow, and is ‘ faſtened round the thigh, by a bandage ‘ fixed to the top of it. Theſe parts conſtitute the ſkeleton of the inſtrument. ‘ To apply it, I fix the foot-piece *a. b. c. d. e.* ‘ in figure 10, on the foot, in the manner

‘ I have

‘ I have deſcribed in the preceding caſe ; I ‘ then lace a bandage, *n. o. p. q.* in figure ‘ 10, round the knee, upon which are ‘ fixed four loops, *r. r. s. s.* in figure 10, ‘ *viz.* two above, and two below the knee ‘ joint ; I likewiſe fix a bandage to the ‘ ſplint, *t. u. v. w.* in figure 10, which is ‘ then laced on the leg. I have, beſides, ‘ two ſtrong ſtraps to the ſpring *x. y.* in ‘ figure 10, one above, and the other below ‘ the knee joint ; I then paſs theſe ſtraps ‘ through the loops *r. r. s. s.* on the knee ‘ bandage in figure 10, and faſten them to ‘ the ſpring of *f. g.* and *g. h.* above and below the knee joint at *g*, which, by theſe ‘ means, are bound to the limb, and the ‘ re-action of the ſpring *f. g.* and *g. h.* ‘ draws the limb into its proper place.— ‘ Upon applying this, with what I have ‘ ſaid on the general principle, as applied ‘ to figures 8 and 9, the action of this in‘ſtrument will be eaſily comprehended. ‘ In the next place, I ſhall inſtance two ‘ diſeaſes, which may be referred to as ‘ ſtriking examples of this laſt ſpecies of ‘ deformities, or diſtortions from improper 'combination of bones, *viz.* when a wry 'neck is produced, either by contraction 'of the ſterno maſtoideus muſcle on one 'ſide, or the loſs of power in the ſame 'muſcle on the other ſide the head, or in 'thoſe diſtortions of the legs, occaſioned 'by contraction of the gaſtrocnemii mu'ſcles, and tendo achilles; when that con'traction is the original cauſe of the diſ'eaſe, or by loſs of power in the antagoniſt 'muſcles; when the contraction of the 'gaſtrocnemii muſcles and tendo achilles is 'only one of the conſequences of that 'want of power, however produced. In 'all theſe caſes, the curative intention is the 'ſame, and by my invention, is effected by 'adopting a ſpring or ſprings, to ſupply 'the deficiency of action in thoſe muſcles. 'Thirdly,—I ſhall exemplify the method of 'curing thoſe defects, which ariſe from 'defects of muſcular action, whatever may 'be the cauſe of that defect, by my me'thod of curing that diſtortion of the leg 'and foot, which is occaſioned by con'traction of the gaſtrocnemii muſcles and 'tendo achilles, or by want of power in

‘ thoſe muſcles, whoſe office is to counter-
‘ act the above-mentioned.—In this kind
‘ of diſeaſe, the heel is drawn up, and the
‘ toe pointed ſtraight forwards, with more
‘ or leſs rigidity, according to circum-
‘ ſtances; the curative intentions are, to
‘ place the limb in its natural poſition, and
‘ reſtore (if poſſible) the natural action of
‘ the muſcles. I examine the diſeaſed part,
‘ to diſcover what muſcle is deficient in
‘ contractile power, and conſider in what
‘ direction that muſcle would draw the
‘ parts, if in its natural ſtate: I then pro-
‘ vide, and apply a ſpring, whoſe power is
‘ equal to the natural power of the defec-
‘ tive muſcle, and whoſe curve is ſuch, that
‘ when bound on the limb, its re-action
‘ will draw it, as much as poſſible, towards
‘ its natural ſtate. If the diſeaſe is occa-
‘ ſioned by defects in the action of more
‘ than one muſcle, I provide a ſeparate
‘ ſpring, to imitate and ſupply the action
‘ of each of the defective muſcles, and
‘ apply them ſeparately, and alternately,
‘ varying their powers and action, until
‘ the whole diſeaſe is eradicated: I apply

‘ theſe ſprings in the following manner; I ‘ provide a ſplint of tin, or other convenient ſubſtance, to cover one half the ‘ leg, and ſerve as a baſis for the ſprings ‘ to act from; this ſplint is lined with leather, wool, or other convenient ſubſtance, to prevent it from galling the ‘ part; it is then bound on the leg, with ‘ any kind of bandage that may be convenient; I then bind the ſpring in ſuch a ‘ direction, that its re-action will draw ‘ the limb, as much as poſſible, towards its ‘ natural ſtate, and leave it in this condition for one, two, or three days, according as the circumſtances of the caſe ‘ will permit; I then unbind it, and alter ‘ its direction, &c. ſo that it may produce ‘ a farther effect; or if it is a complex caſe, ‘ and various ſprings are neceſſary, I apply a different one, for the ſame or a like ‘ ſpace of time, and thus proceed gradually, until the cure is complete. There ‘ is another ſpecies of deformity, ariſing ‘ from, or connected with improper combination of bones, that may be materially ‘ benefited by this invention, *viz.*—Incurvation

Plate. 3.

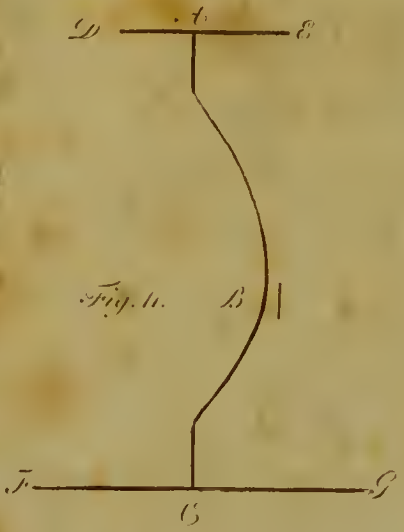

Fig. 11.

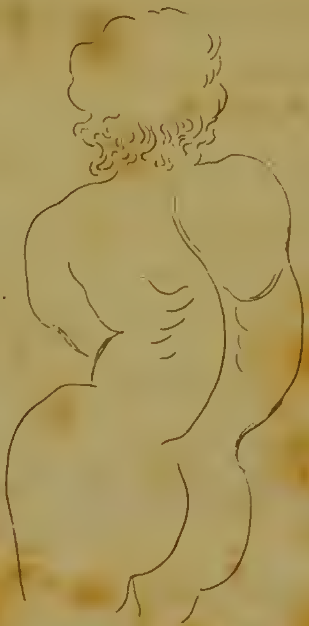

Fig. 13.

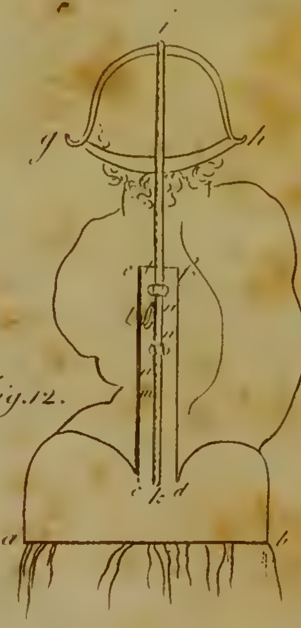

Fig. 12.

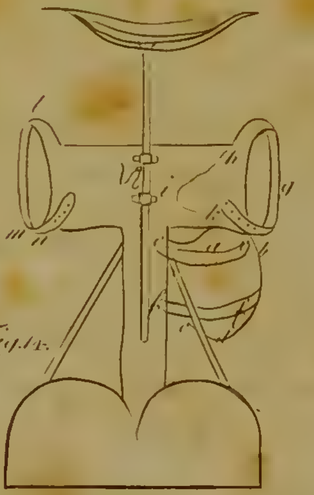

Fig. 14.

Sheldrake's Patent.

‘ vation of the ſpine and its manifold con‑ ‘ ſequences: upon this ſubject I ſhall lay ‘ down a ſimple propoſition, which thoſe ‘ who are acquainted with the ſtructure of ‘ thoſe parts will comprehend, and then ‘ more particularly explain the application ‘ of it. All the mechanical methods of ‘ treating this diſeaſe, that have as yet ‘ been practiſed, are reducible to two, *viz.* ‘ Firſt, To produce extenſion of the ſpine, ‘ by ſuſpending the weight of the body from ‘ the head; and, ſecondly,—By firmly em‑ ‘ bracing the head and pelvis, and, by me‑ ‘ chanical means, lengthening the ſpace be‑ ‘ tween them. It may be ſaid, with truth, ‘ that either of thoſe means will have ‘ effect; but my invention added to theſe, ‘ makes a material improvement upon them: ‘ my principle, as applied to this diſeaſe, I ‘ thus demonſtrate: Let the curved line ‘ *a. b. c.* in figure 11, repreſent the diſtort‑ ‘ ed ſpine, the lines *d. e.* and *f. g.* at the ‘ top and bottom thereof, the parts of any ‘ apparatus fixed on the head and pelvis; ‘ it is obvious that if ſuch apparatus is ‘ firmly fixed on thoſe parts, and after‑ ‘ wards ſufficiently lengthened, the curved

‘ ſpine,

‘ ſpine, that is extended between them, ‘ muſt in the end become ſtraight; but my ‘ improvement is to add ſprings, properly ‘ adapted, to preſs, at the ſame time, on ‘ the projecting part of the curve, by ‘ which means the extenſion is accelerated and facilitated, ſo that the curve ‘ will be ſtraightened in much leſs time, ‘ and with leſs force, and leſs inconvenience to the patient, than by any other ‘ method. I ſhall now proceed to the ‘ application of my invention to cure diſtortions of the ſpine, which are the ‘ moſt complex and moſt varied of diſeaſes ‘ ariſing from improper combinations of ‘ bones, and which I thus demonſtrate. ‘ Figure 12 repreſents the inſtrument for ‘ curing that diſeaſe, invented and made ‘ public by me, ſixteen years ago, and ‘ which is no part of my preſent invention, ‘ or included in this patent—*a. b. c. d. e. f.* ‘ is the part intended to fix on the pelvis, ‘ *g. h. i.* is the part to fix on the head, and ‘ *i. k.* the back, which connects the two; ‘ on this is the ſpring catch *l.*, which falls ‘ into notches, *n. n.* in the upright bar *c. d.* ‘ *e. f.* as it is raiſed, and thus produces

‘ extenſion. The figure 13, repreſents the ‘ back view of a patient with diſtorted ſpine, ‘ and, in conſequence, projection of the ‘ ribs, and enlargement of the ſcapula on ‘ one ſide, with a proportionate diminution ‘ of thoſe parts on the other ſide ; and, figure 14, repreſents the ſpinal machine ‘ (which forming no part of my preſent ‘ invention, it is unneceſſary for me to ‘ deſcribe) with additions upon the principles of this invention, conſiſting of a ‘ pad, *a. b. c. d.* properly guarded, and connected with ſprings *c. e.* and *f. f.*, fixed ‘ to the back of the machine at *e.* and *f.*, ‘ and intended to preſs on the projecting ‘ ribs ; another pad, *h. i. k.* connected by ‘ ſprings, with the inſide of the back of ‘ the machine, and intended to preſs on ‘ the projecting ſcapula ; one elaſtic ſpring ‘ ſtrap, connected with it, is intended to ‘ depreſs the elevated ſhoulder, *h. g. k.* and ‘ a ſimilar one, *l. m. n.* to raiſe that which ‘ is below its proper ſituation. Whoever ‘ conſiders the general principles of this ‘ my invention, in this, its application to ‘ the claſs of diſeaſes at preſent under

‘ conſideration, will ſee, that theſe additions, upon the principle I have already ‘ deſcribed, are a part of my preſent invention, and included in this patent, and ‘ are a material improvement to my former ‘ method of treating this diſeaſe. To ſuch ‘ perſons as may in future practiſe this ‘ method of curing theſe diſtortions, &c. ‘ the following rules which I adhere to, ‘ will be uſeful in addition to what is before ſtated, in aiding their own judgment ‘ and experience, in the application of this ‘ my method, *viz.* Firſt, In curvature of ‘ bones, a ſmall force ſhould be at firſt applied, and afterwards gradually increaſed ‘ to the utmoſt extent that can be applied ‘ without injury to the ſoft parts which lie ‘ under the inſtruments; and, ſecondly, ‘ In improper combination of bones, or ‘ defect of muſcular action, the force to be ‘ uſed ſhould be ſomething more than the ‘ parts affected would exert if in their natural ſtate. IN WITNESS, &c.’

23d February, 1797.

THE END.

## LATELY WAS PUBLISHED,

*Price 3s. ſewed.*

OBSERVATIONS on the CAUSES of DISTORTIONS in the LEGS of CHILDREN, and the Conſequences of the pernicious Means, generally uſed, with the Intention of curing them; with CASES to prove the Efficacy of a Method of Cure invented and practiſed only by

T. SHELDRAKE,

*Truſs-maker to the Weſtminſter Hoſpital and Mary-le-Bone Infirmary.*

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Of this Work the ENGLISH REVIEW gives the following Account:

‘ This work conſumes many pages, in animadverting on the defects of other operators, and mechanical contrivers of inſtruments, for what is called the Club-foot, &c. There are plates that exhibit an explanation of what the writer advances: caſes follow, with the reſpectable names of JOHN HUNTER, the ingenious Mr. LYNN, Dr. TURNBULL, and Mr. KNIGHT, whoſe profeſſional reſpectability is well known.

‘ 1ſt. The Author ſuppoſes the Club-foot to be owing to compreſſion of the fœtus in utero.

‘ 2dly. The cure ſhould be attempted as early as poſſible after the birth, before oſſification be completed; after which he thinks the cure uncertain.

3dly. ‘ This, the author declares, is effected by the uſe of elaſtic bandages, which he invented, and with much labour hath improved.

‘ The incurvation of the bones of the leg is conſidered, ‘ with an explanatory plate.

‘ In conſidering this work, it is neceſſary to remember, ‘ that figulus figulum odit; one truſs-maker another: but, ‘ on examination, it muſt be confeſſed, that Mr. SHELDRAKE's ‘ obſervations are *reaſonable*, and that the intentions of the ‘ elaſtic bandages are *plauſible*. The incurvation of the bones ‘ of the leg certainly require mechanical contrivances to ‘ remove their deformities; and if, on experience, the inven‘tions of Mr. SHELDRAKE be found ſuperior to thoſe hither‘to uſed, he will merit the approbation of all mankind.’

As we are all, in different degrees, the children of imperfection and error, it is not unreaſonable to conclude, that this Reviewer miſunderſtood a part of my deſign, becauſe I did not ſufficiently explain it. I certainly had no intention to *animadvert on the defects of others*; my deſign was to ſhew, exactly, what had been done by others, that I might make good my title to what afterwards might be done by myſelf: having done ſo, I have, in the preſent work, confined myſelf to the explanation of my own ſyſtem and its effects, which I hope, will prove what claim or pretence I may have to the premium held out by the Reviewer, *viz.*

‘ *The approbation of all mankind.*’

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